

# AVIATION

*The Oldest American Aeronautical Magazine*

MAY 14, 1928

Issued Weekly

PRICE 20 CENTS



Flight picture of a Waco 10 (Wright Whirlwind), with Charles W. Meyers at the stick.

VOLUME  
XXIV

## *Special Features*

The Navy PN-12 Seaplane  
The New Curtiss "Chieftain"  
The Langley Field Maneuvers

NUMBER  
20

AVIATION PUBLISHING CORPORATION  
250 WEST 57 STREET, NEW YORK

Publication Office, Highland, N. Y. Entered as Second-Class Matter, Nov. 22, 1920, at the Post Office, at Highland, N. Y. under Act of March 3, 1979.

TOLEDO  
PUBL.  
LIBRARY

# Thirteen Years of Pioneering in Aircraft Motor Development — 1915-1928



## PACKARD POWERED NAVY SHIPS SET PERFORMANCE RECORDS

**F**LYING a total of nearly 250,000 miles without ground, twenty-three Navy ships powered with 400 HP Packard Aviators Engines have successfully completed several months of torpedo practice at Guantanamo Bay, Cuba. The records they established of consistent, dependable performance mark a high development in the efficiency and reliability of the nation's air defense equipment.

Day after day, these ships were put through strenuous maneuvers. Carrying a full, regular



Model TQM-2 Three Piston Ship — Reaping Torpedo and Scoring — Equipped with Packard 400 HP Aviator Engine Model 2A 2700. Drive

ton load — a crew of four, gasoline enough to give effective range and a 1740 pound top speed — they easily accomplished difficult tests.

As all these Packard Aviator Engines met every demand for power, speed, and endurance — qualities which have made Packard Motors the choice of experts throughout the world.

## PACKARD AVIATION ENGINES

ASK THE MAN WHO OWNS ONE

TRANS 500 for marketing AVIATION



## WHY CAMINEZ?

An engine for aircraft must be more than an engine. It must possess the efficiency, reliability, minimum maintenance and maximum durability.

It must be supplemented by a thoroughly trained and highly responsible manufacturing organization . . . such as is back of the Fairchild Caminez engine.

With a new factory built on its own flying field . . . with a quarter of a million dollars of individual-drive precision machinery installed and running . . .

With a trained organization from metal bursters to service engineers . . . with factory service branches in Chicago, Dallas and Los Angeles — these are but a few of the evident propensities which the Fairchild Caminez Engine Corporation has made to serve this year's demand for horsepower aircraft engines.

The reliability of Fairchild Caminez engines has been proven conclusively by innumerable official tests, as well as by extensive flying.

A Caminez engine can be serviced or overhauled in a fraction of the time required for other engines, because it has only half as many parts. As a result of the unusual efficiency of its slow-speed propeller, it will climb 10% faster than any ungraded engine of equal horsepower.

Every part of every Caminez engine is made, inspected and tested in the Fairchild Caminez plant, where uniform excellence of materials and workmanship are maintained to the highest degree. An assurance and maintenance so that you can depend on service for your 1935 Caminez engine in 1932 or in 1938.

Fairchild Caminez engines are ready to serve your needs — to give you a new performance thrust. They are now used in Kevlar-Banner, Travel Air and Waco planes. For performance particulars, specifications and complete data, address the Fairchild Caminez Engine Corporation, Farmingdale, Long Island, N. Y.

SUBSIDIARY OF FAIRCHILD AVIATION CORPORATION



This is the first unit of the FAIRCHILD CAMINEZ ENGINE plant, the present production of which is fifteen engines a week.

## CAMINEZ ENGINES



TRANS 500 for marketing AVIATION

# The camera tells Mobiloil's story

Some of the famous Mobiloil flights are recorded on this page. Regular stock Mobiloil has lubricated a large percentage of the great flights in aviation history. You are always sure when you use —

The World's Quality Oil  
**Mobiloil**  
VACUUM OIL COMPANY



(above) C. W. MEYERS wants to be sure. "As you know, I was lucky enough to win first place in Class 'B' (New York - Spokane) using Mobiloil. It made the usual perfect result."

**Mobiloil**



(above) JAPAN GREETs a Czechoslovakian Red Col. Sisk's Mobiloil-lubricated plane arrived after his successful flight from Prague to Tokyo.

(below) A CLOSE-UP of "St. Louis" The "Spirit of St. Louis" has flown over 21,000 miles with Mobiloil and without engine trouble.



(above) "ART" GOEBEL, the only flight winner — holds a man of the oil that turned his entry to success.



(left) THE MEN who flew around Japan last year were in Mobiloil at Nagoya, Southwestern Japan.

(right) MAJOR MILLER, who flew around the Globe of South Africa, makes use of every lubrication for his air gear.



VACUUM OIL COMPANY New York, Chicago, Philadelphia, Denver, Buffalo, Detroit, St. Louis, Pittsburgh, Cleveland, Cincinnati, Minneapolis, Kansas City, Tulsa

Other branches and distributing warehouses throughout the country

THANK YOU for mentioning AVIATION



The Leviathan

Western Air Express  
Fokker Transport  
3 Wasps



The 20th Century Limited



## MULTI-MOTORED RESERVE POWER

The Leviathan, largest ship in the world, uses 65,000 Horse Power at normal cruising speed. There is available 90,000 Horse Power.

The Twentieth Century Limited, crack train of the New York Central, uses 1500 H. P. on its normal high speed run. There is available 4000 H. P.

The 1928 Wasp Engine Fokker Transports, purchased by Western Air Express for the Daniel Guggenheim Safety Passenger Line, use 600 H. P. in normal cruising. There is available 1200 H. P.

THE  
**PRATT & WHITNEY AIRCRAFT CO.**  
HARTFORD CONNECTICUT

THANK YOU for mentioning AVIATION

# The OX5 Situation and Miller Airplane Products

**L**AST November MILLER AIRPLANE PRODUCTS factory opened its doors. This factory started production on a moderate scale of a number of OX5 superchargers, which were the inventions of Mr. Miller and which had proven their merit on his own ships as well as hundreds of other OX5 motorized ships whose owners desired to obtain the wonderful results on their motors that Mr. Miller's inventions have made possible in the OX5. Most MILLER PRODUCTS have been in use for years



Leslie C. Miller

although never before the opening of our factory were they advertised in the usual way. The only sales organization Mr. Miller had in past years was the satisfied users of his products who at every opportunity highly recommended their use to their friends. In this manner over a thousand sales were accomplished. At the beginning a production schedule was decided upon which was considered adequate to care for the expected demand. Within two weeks we were forced to double production, adding more equipment and skilled personnel and yet the demand was greater than the supply. One principle of our plant ever since the start has been prompt deliveries, but due to the ever increasing sales, this has been impossible until this date. Now we have many times more equipment, skilled men and floor space, and today are on a production schedule equal to the extraordinary demand for our products and we believe that from this date we can realize our ambition to make prompt deliveries on all orders.

To those who in the past our delivery service seemed tardy, we apologize, we did our best, and now promise prompt service to both old and new customers.

Just a word regarding our book, "Rev's for OX's." Over 2,000 copies of this book have been sold to OX owners who wanted to benefit by the store of knowledge of OX motors obtainable in this little book, which sells for \$1 and has many suggestions any one of which is worth twenty times the price. This book has just been re-written by Mr.

Miller but still sells at the original price. In re-writing Rev's for OX's he has retained the same value to the OX user and in addition has arranged the book in such a manner that it can now be used in connection with the training of new flyers. Rev's for OX's was recently submitted to the chief instructor in the aviation department of one of the largest educational institutions in the world. This instructor's comments are as follows: "May I express my appreciation of a job well done? Certainly for the purpose of conveying definite information to the reader, Mr. Miller has turned out a fine piece of work. I was able to obtain much information from this booklet that has cleared up doubtful points in my own mind." This is only one of the many unsolicited compliments received every day for Rev's for OX's. Write our information bureau for any information you may desire regarding the OX5 motor. Mr. Miller will gladly help out without charge anyone who requests this service.

## MILLER AIRPLANE PRODUCTS

P. O. BOX 643 or 3827 W. JEFFERSON ST., LOS ANGELES, CALIF., Phone Empire 3870

Write for Descriptive Folder of all Miller Airplane Products

THANK YOU for mentioning AVIATION

# Buy MILLER AIRPLANE PRODUCTS



## REV'S FOR OX'S

By LESLIE C. MILLER

A book explaining all insides of the OX-5 motor and its controls for each type. Also to get more knowledge, efficiency, reliability and economy out of your motor. The author has over 1000 flying hours experience with the OX-5. PRICE ONE DOLLAR

## MILLER'S POSITIVE INTAKE VALVE CONTROL FOR OX'S

From 1575 on gas, adds 20 to 30 mph to the motor speed, takes all stress from the overhead, greatly reduces flexibility in pins, bearing wear, valve guides and pull rod. Also one thousand psi more in use on OX's in pins, speed, loads and saving time. Standard equipment on Alexander Engine and now being adopted by other leading manufacturers.

PRICE, per set of eight, \$10.

## MILLER'S ROLLER ROCKER ARM

Preventing wear on exhaust valve guides and seats, doubles the life of the OX cylinder. The roller rolls freely across the valve stem end, instead of sticking and exerting a tremendous side pressure on the guide and valve seat as is the case with the former tappet. More power longer sustained.

PRICE, per set of eight, \$15.

## THE MILLER OVERHEAD SYSTEM

Includes the roller roller arm and single valve control, all valves pass on every cylinder and all under complete pressure from one Cincinnati Ball Valve. Under lubrication from one oil cup on Transmation. Flights on Wheelwork. These steps removed and unified into life and push rod

pins at each of pins. Positively prevents loss of gas, includes all oil and dust, and retains the lubrication. The large pins are in bronze bearings. Exhaust push rod pins are bronze. Wide design at bottom of valve seat prevents rubbing, binding guides and broken seats.

Price for Eight cylinders, \$85.00. With rods \$90.

## MILLER VALVE GUIDE REPLACEMENT SET

Includes a jig which fits to top of OX cylinder, through which a hand operated and motor is guided in absolute alignment to cut out old guide. A top opening through into the guide hole. We make the threaded gray cast pins.

Complete Set \$38.

Gray Iron Valve Guides \$65

## VALVE SEAT REAMER SET

Includes push rod, sanding, and reaming and seat reaming. Every thing necessary to make new area or to re larger valves.

Complete Set \$22.50

We have standard and overcast valves medium light compression pistons piston pins, piston rings, roller arm pins, etc. Write for list.

Miller airplane products are sold on 30 days trial. Money refunded on all satisfactory purchases.



## MILLER AIRPLANE PRODUCTS

P. O. BOX 643 or 3827 W. JEFFERSON ST., LOS ANGELES, CALIF., Phone Empire 3870

5% discount for cash with order. 10% deposit required on all orders. Write your supply house or order direct

THANK YOU for mentioning AVIATION

## The Consolidated Courier



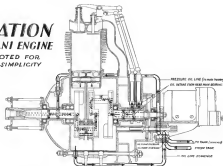
**Consolidated Aircraft Corporation**  
Buffalo, N.Y.



TRADE MARK for standard AVIATION

## LUBRICATION OF THE ANZANI ENGINE

A SYSTEM NOTED FOR  
ITS EFFECTIVE SIMPLICITY



SINCE the successful operation of any engine depends so much upon a proper supply of oil, the Anzani engine was designed with full appreciation of its great importance. Years of development have shown the stability, along with the use of simple parts. The principal reason for the unflinching performance of the Anzani lubricating system is its utmost simplicity—its few parts are rugged and easily accessible.

From the tank the oil is led to a pressure pump which forces the oil of supply to the main bearings and through the oil-drilled passages in the crankshaft to the pistons. The rotary face draws the oil to a line which lubricates cylinder walls, valves and bearings. Likewise, the timing gears at the rear of the engine are simply lubricated by the pressure supply. The excess oil collected in the crankcase is drained through the scum pipe at the bottom of case. The oil

before being put into circulation goes through a fine filter and, purified, is led back to the tank.

Proper clearance is given all working parts in order to obtain best results from the use of mineral oil. All Anzani engines are tested with mineral oil (Mobiloid II). Any high grade oil corresponding to Liberty Aero Oil numbers 1 and 2 may be used satisfactorily.

The 1935 model Anzani Engines are especially adapted to American commercial use. They embody many new special

features which assure the utmost in economy and dependability of operation for all requirements of from 15 to 120 h.p. We will be glad to furnish complete specifications. Let us know your requirements.

This table lists the 1935 models of the Anzani Engine with a power plant range to meet the requirements of light aircraft.					
Model	Weight	W. of	Power	Single	Price
H.P. x 12 in. (200) (1000) (1000) (1000) (1000)					
100	120	140	5	1-120	1-120
120	140	160	6	1-140	1-140
140	160	180	8	1-160	1-160
160	180	200	10	1-180	1-180
180	200	220	12	1-200	1-200

The prices listed are for standard models, including complete installation and delivery.

BOWSBACK MOTOR LABORATORIES, Inc. • A 1935 Dayton Building • New York City • Sole Representatives for the Anzani Aviation Engine in North and South America, Australia and Japan • Pacific Coast Distributor: G. C. Lumsden, 1516 Grand Avenue, Los Angeles, California • Canadian Distributor: BRONCO AIRCRAFT, LTD., 47 Jarvis Street, Toronto



THE NEW SERIES  
RADIAL AIR COOLED

# ANZANI ENGINE

TRADE MARK for standard AVIATION



# You will want this New Catalog



**Before Lighting Your Airport**  
consult the pioneers in aviation lighting.

Complete installation layout will be furnished by our engineering experts without obligation. If you do not have this new catalogue your copy will be gladly forwarded on request.

**B.B.T. CORPORATION OF AMERICA**



THANK YOU for sending AVIATION

## AVIATION

The Oldest American Aeronautical Magazine

EARL D. GUNDEL, Publisher  
LESTER D. GUNDEL, Editor  
GEORGE NEWBOLD, Business Manager  
ALBERT F. MULLIGAN, Asst. Business Manager  
B. SHERMAN BOWEN, Jr., Editor  
RICHARD M. HOCK, Technical Editor  
HENRY J. FOSTER, News Editor  
DAVID J. LEE, Art Editor

Vol. XXIV May 14, 1935 No. 20

### Index to Contents

EDITORIAL	1363
THE NEW COMBAT "CYPRESS"	1364
THE NAVY PM-12 SEAPLANE	1366
COAST GUARDIAN	1367
THE LANGLEY FIELD MUSEUM	1368
ADVERTISING IN AVIATION	1369
THE LOCKHEED "AIR REFINER"	1370
NEWS	1372
LOW MOUNTAIN BRIDGE	1381
THE SHIPS	1412
FOREIGN NEWS	1414
ARMY AND AIRWAYS	1416
U. S. AIR FORCE	1420
INDEX TO ADVERTISING	1423

### AVIATION PUBLISHING CORPORATION

Business and Editorial Office  
250 West 57th St., New York City  
Cable Address: AEROSINO  
Publication Office: Highland, New York

Subscription price: Five dollars per year. Canada, five dollars. Foreign, six dollars. Single copies, fifteen cents. Back numbers, 25 cents. Advertising rates on application. Special rates for students. Forms sent on request. Printed on government-ordered paper. Published at the Post Office at Highland, N. Y., under act of March 3, 1917. Copyright 1935 by Aviation Pub. Corp.

### For Your Convenience in Subscribing

Please send AVIATION to

.....  
.....  
.....

Enclosed find check ( ) money order ( ) for \$ ....



The Lockheed "Vega" Monoplane, powered with a 200 horsepower Wright "Whirlwind" Engine . . .



equipped with

## SCINTILLA

Aircraft Magnets



**SCINTILLA MAGNETO COMPANY**  
SIDNEY, NEW YORK

Contractors to the U. S. Army and Navy

THANK YOU for sending AVIATION

# Two Wireless Messages

"We Have Reached Spitzbergen After Twenty and a Half Hours Flying. We Made One Stop for Five Days on Account of Bad Weather."

GEORGE H. WILKINS



"Congratulations on Performance Wright Whirlwind Functioned Perfectly Every Minute of Flight from Barrow to Spitzbergen in Temperature to Forty-eight Below Zero."

The story of the flight is too well-known to need repeating. The reliability of the engine has again been demonstrated. The skill of the flier—the perfection of the plane are facts known to all. Just two wireless messages tell all that is necessary of the magnificent deed, and the great Wright Whirlwind Engine played its part over across the top of the world.

WRIGHT AERONAUTICAL CORPORATION  
FARMINGTON, N. H. U. S. A.

**WRIGHT**

THANK YOU for supplying AVIATION



The Oldest American Aeronautical Magazine

Vol. XXIV

MAY 14, 1935

No. 29

## The Tenth Anniversary

THIS WEEK, which has been officially designated by the Air Mail Week, marks the tenth anniversary of the inauguration of air mail service in this country. On May 15, 1925 the first regular service, operated with plane and pilots borrowed from the War Department, was started between New York and Washington, D. C. Today there are over 23 routes in operation covering a total distance of 30,740 miles, 6,000 miles of which are used for night flying. These routes serve some 31 cities and, according to a recent announcement by the Department of Commerce, every state in the Union will be served by air mail before the end of this year. For the first nine years and two months of this decade a regular air mail service was carried on by the Government, but since the end of that period the service has been in the hands of private owners. What they have done in the way of expansion and betterment of air mail service is well known. Their accomplishments would doubtless be tributed to American planes, American pilots, and American business methods. Ten years ago the Government showed the way and today American commercial aeronautical enterprise is carrying on its regular work and making the air mail pay without the expense of direct subsidies.

## The Aeronautical Center

MANY TOWNS are making a bid to become the "Detroit" of the aircraft industry. So far Wichita, Kan., seems to have been able to attract more companies and to build up a higher production than any other town in this country. The citizens of Wichita are keenly aware of the possibilities of growth in the aircraft industry but other cities are awakening and the competition is becoming keen. If the efforts of the Board of Commerce are not only fewer Detroit would already be ahead.

Even when a town has become a center it is sometimes hard to analyze just why this has occurred. Proximity to the raw materials is certainly one factor. In the case of airplanes this factor is of lesser importance because the raw materials are comparatively light and expensive while the cost of shipping the finished product, which is very bulky and delicate, is much greater than the cost of shipping the raw material. Airplanes should ideally therefore be built fairly near to the point where the greatest number are likely to be used. The labor factor is the second important factor. Often, as in the case of Detroit, there was a comparatively small supply of labor and labor has followed the growth of the industry. Initial labor conditions must be favorable but it is very debatable whether the proximity of a very

large and powerful specialized industry, creates a really favorable market. When the powerful industry has a big boom it is almost sure to draw away a large proportion of the labor of the smaller industry. Adequate financing and skilled management are also of extreme importance. If the industry grows as we expect it to it will be hard for the small town to secure adequate financing. The management problem will to a considerable extent settle itself because the personnel will grow up with the center.

Of course it may be possible that there will not be an aeronautical center. Few industries are concentrated to the extent that the automobile industry is concentrated in Detroit. Shipping cost will tend to spread the industry and also the problem of producing thousands of small planes is very different from that of producing a few giant air transport planes. Under present manufacturing methods it is comparatively easy to start an airplane factory in a town. Within a few years however, production will warrant the installation of very expensive machinery and the town with the other required advantages which first gets the machinery in operation will likely become the aeronautical center.

## Correct Pronunciation

A SHORT time ago we had the pleasure of listening to a group of prominent city officials endorse a tree of famous aviators. The various orations were splendidly delivered with the exception of the pronunciation of a most important word. That word was "aeronaut", and strange as it may appear, those city officials are not the only ones who abuse the word. In fact many persons directly engaged in aeronautical industry pronounce the air in aviation as they pronounce the air in the word aeronaut.

That is absolutely incorrect and reference to any standard dictionary will show that the first 'a' is pronounced exactly the same as the second 'a'. Not only is this true for the word aeronaut but also for the word aviator.

Perhaps to some the correct pronunciation of aeronautical terms is a small item, but to the majority it is of importance. If for no other reason than the desire to speak good English. Just now the aeronautical industry is engaged in the work of educating the non-flier public in the ways of the air. If it is to be a good teacher of the major lesson, it might just as well be a good teacher of the minor lesson. In other words, pronunciation is not an afterthought.



# The New Curtiss "Chieftain"

12 Cylinder Hexagon Engine Rated at 600 Hp. Weighs Only 900 Lb.

By ARTHUR NUTT

Chief Engineer, Curtiss Development & Motor Co., Inc.

EIGHT TEARS were recently completed at Mitchel Field, L. I., on the new 600 hp. Curtiss "Chieftain," largest air cooled aircraft engine in the country. The tests were conducted with the engine installed in a two-seater Curtiss Falcon, standard observation and attack plane of the Army Air Corps. The plane was flown by Lieut. E. P. Guinn, Army pilot stationed at the Curtiss factory, and by "Coney" Jones, veteran Curtiss pilot.

Equipped with the "Chieftain" engine, the "Falcon" showed a performance that was superior to that of any other motor in the service. Its top speed was 155 m.p.h., and the service ceiling 22,500 ft., while the initial rate of climb was 1875 f.p.m.

The most remarkable feature of this performance is the speed of 155 m.p.h., which is usually for some time held to be unobtainable from a water cooled engine of the same power in the same plane. Certain engineers point out that this is the first time in history that air cooled engines have been able to compete directly with water cooled types in pure speed. Usually, the substitution of an air cooled engine for a water cooled engine of the same power, while producing improved climb and ceiling, has resulted in a sacrifice of several miles per hour in top speed.

The most speed characteristic of the Chieftain engine is due to its unusual design, which is different from that of any other air cooled engine. Instead of having one row of cylinders arranged radially, as in the common practice, the Chieftain has two rows one behind the other, with six cylinders, arranged horizontally, in each row. This arrangement



Front quarter view of the new Curtiss "Chieftain" 600 hp. air cooled engine.

naturally reduces the overall diameter of the engine, its reducing the head resistance and increasing the lift per foot. The frontal area per horsepower of the Chieftain engine is approximately one-half of the conventional row engine air cooled engine.

The Chieftain engine has been under development by a Curtiss company for the past two years, with the summer and fall of the Air Service. It performed creditably throughout the trials at Mitchel Field, and is now to be flown by Wright Field, Dayton, Ohio, for Air Corps tests.

In April 1933 a study was started on the design of a 600 hp. air cooled aircraft engine. The first step in the study was to analyze the types of engines in use at that time in the study the possibilities of the different forms of engines which would be suitable in the large size contemplated. The types that were finally selected for study were as follows:

- 9 Cylinder Single Row Radial
- 9 Cylinder Two Row Radial
- 12 Cylinder X
- 12 Cylinder Vee
- 12 Cylinder Hexagon

In making this study 10 important characteristics were taken into account.

1. Low weight per horse power
2. Head resistance and propeller efficiency
3. Velocity from the pilot's cockpit
4. High crankshaft speed
5. Overhead valve gear for high speed
6. Exhaust arrangement
7. Control of cooling air
8. Arrangement of valve gears
9. Overall dimensions particularly diameter and length
10. Smoothness of operation

Nine Cylinder Single Row Radial

This type would require an engine of from 1800 to 1900 in. to develop about 600 bhp. at a speed in the neighborhood

of 14, 1935

a 1000 rpm, which is probably a rather optimistic speed to expect to obtain as engines of the power and displacement, and in the fact that the size of the cylinder bore is made of a point where cooling is difficult, and the reciprocating weight of an overstroke (even though it may be of the split crankshaft or a solid leg and type) would be a difficult problem. The outside diameter of a nine cylinder radial engine of this power would be 50 in. to 55 in., in diameter which would be too large for most air with severe blockading of its propeller, resulting in poor propeller efficiency. The nine cylinder increases the resistance so much that it has not been found by experience that the larger radial engine in most places beats generally on more speed than the lower horse power radial engines with the smaller diameters. On some, the rate of climb is increased but this does not offset the disadvantages of carrying high power engines along more without passing more top speed.

The greatest problem on a nine cylinder radial becomes very difficult on the size of the engine increases. The manifold and its main very large in order to decrease the back pressure. The manifold assembly then becomes very heavy, unreliable and cumbersome, resulting in the necessity of increasing a between the propeller and cylinders where it is actually has a detrimental effect on the cylinder cooling as well as making the cylinders very incompressible. A large diameter radial engine does not lend itself to good cooling and the adaptation of shrouds for control of cylinder temperature and oil temperatures under various weather conditions. It is necessary to use push rod valve mechanism with a consequent difficulty of lubrication of the rocker arms, and so on and so forth. The lubrication would be fully adequate without adding a great many pipe fittings and tubing which would not be reliable, would increase the expense and would be very unsatisfactory.

Fourteen Cylinder Two Row Radial

The type of engine has been used by several manufacturers a power up to 400 hp., and it is objectionable on account of its lack of satisfactory cooling of the rear row of cylinders. The cylinder spacing is so close when the outside diameter of the engine is held in a minimum that the rear cylinders get hot air from the front cylinders. The push rod valve mechanism is also unsatisfactory on account of the necessity of strengthening the cylinders to a great degree in order to keep the engine diameter down, resulting in high speed limits to the push rods and possibility of increased wear on the pins.

The weight per horse power on the double row radial is slightly higher than the single row radial but it has the ad-

AVIATION

1365

vantage of a small diameter which was the reason for investigating this type of engine. The displacement would have to be approximately 1800 cu. in., which would allow smaller cylinders than could be obtained in a nine cylinder type. With these engines, the nine cylinder radial and 14 cylinder vee push rod valve gear, are probably limited in



Front view of the new Curtiss "Chieftain" 600 hp. air cooled engine.

engine speed although the engine speed has in the past few years been increased slightly over what was originally thought could be used with this type of valve gear. There is no question, however, that the push rod valve gear is inferior to the overhead type where high engine speeds are used.

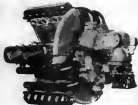
Twelve Cylinder X

The X 12 cylinder engine has not been given a great deal of consideration on account of the large number of cylinders making the engine more expensive and the necessity of using very heavy materials on the crankshaft to make the engine run smooth. The engine would also be heavier than the radial type on account of the longer crankshaft, although the diameter would be very satisfactory.

Twelve Cylinder Vee

This type of engine has been built successfully with air cooling, it has one very great objection, namely, its overall

Continued on page 1355



Rear quarter view of the "Chieftain" showing the Spheribelt magnets and Stromberg carburetor.



Showing the new Curtiss "Chieftain" 600 hp. engine fitted in a Curtiss "Falcon" observation plane.

# The Navy PN-12 Seaplane

First Patrol Plane Fitted With Air Cooled Engines has Top Speed of 107 M.P.H. and a Cruising Range of 1,350 Mi.

By COMDR. W. W. WEBSTER (CC), U.S.N.

Chief Engineer Naval Aircraft Factory

THE PN-12, the Navy's first patrol plane with air-cooled engines, has completed its preliminary tests at the Naval Aircraft Factory, Philadelphia, Penna. This airplane, for some unknown reason, has been referred to in the press as a mystery plane. As a matter of fact, this airplane is merely another step in the Navy's development of the twin-engine, heavy boat type of plane for patrol work with the fleet, coastal patrol, observation patrol, etc. This type started with H-36 and P-5-L during the World War, and has been developed step by step as indicated by the following table. The development of this type has been charge of H. E. Cocklin, senior aeronautical engineer at the Naval Aircraft Factory.

Model	Year	Engine	Wing	Span	Wing Area	Wing Loading	Wing Area	Wing Loading	Wing Area	Wing Loading
P-5-L	1919	Wood	Wood	34.7	110	11.0	11.0	11.0	11.0	11.0
P-5-L	1920	Wood	Wood	34.7	110	11.0	11.0	11.0	11.0	11.0
P-5-L	1921	Wood	Wood	34.7	110	11.0	11.0	11.0	11.0	11.0
P-5-L	1922	Wood	Wood	34.7	110	11.0	11.0	11.0	11.0	11.0
P-5-L	1923	Wood	Wood	34.7	110	11.0	11.0	11.0	11.0	11.0
P-5-L	1924	Wood	Wood	34.7	110	11.0	11.0	11.0	11.0	11.0
P-5-L	1925	Wood	Wood	34.7	110	11.0	11.0	11.0	11.0	11.0
P-5-L	1926	Wood	Wood	34.7	110	11.0	11.0	11.0	11.0	11.0
P-5-L	1927	Wood	Wood	34.7	110	11.0	11.0	11.0	11.0	11.0

Note: The PN-12 is of a different design and is indicated in this table.

Practically the same hull form and displacement have been maintained throughout this development.

As will be seen from the above, the principal advance in the PN-12 over the P-5-L is the substitution of metal wings for wood wings and two Wright R-1700 air-cooled engines for the former Packard water-cooled engine. With the lat-

ter change a saving of 1450 lb. was effected in gross weight, with but a small loss in horsepower.

In the PN-12, therefore, is incorporated all of the proven structural and aerodynamic features, applicable to this type of plane, including metal construction, aluminum-coated engines, and complete navigational and radio equipment, including radio compass and arrangements for auto and recovering when on the water. The metal structure of this plane includes two complete and two partial wing bulkheads and all possible arrangements for mounting of gun, in case of a forward landing. An additional feature on the PN-12 is an adjustable stabilizer.

Since the tests of the PN-12 have not been completed, it is not possible to give actual performance data at this time. However, the calculated design data, based on the engine developing 520 hp. each at 1800 rpm, and a maximum service weight of only 13,100 lb., is given in the table below. For the purpose of comparison, the corresponding data of the P-5-L is given in the second column.

## Service Conditions as Patrol Plane

	PN-12	P-5-L
Gross Weight, lb.	13,100	14,500
Wing Loading, lb./sq. ft.	7,500	11,000
Empty Load, lb.	6,600	6,600
Gasoline, gal.	750	750
High Speed, m.p.h.	107	107
Stalling Speed, m.p.h.	30	30
Service Ceiling, ft.	30,000	30,000
Endurance, hr. (leveling)	35	35
Range, mi. (cruising)	1,350	1,350

Continued on page 1404



Front quarter view of the Navy PN-12 powered with two Wright "Cyclone" engines.

# Chassis Analysis

Stress Analysis of Commercial Aircraft, Chapter Number Ten

By PROFESSOR ALEXANDER KLEMIN

Chief Engineer School of Aeronautics

And GEORGE F. TITTELTON

Chief of the Bureau of Aeronautics, Navy Department

ALTHOUGH the wings have been analyzed the usual practice is to analyze the chassis. The experienced pilot may long as a plane smoothly as a ground vehicle but essentially a landing must be made on a rough field or on a wet surface and a heavy landing results. The chassis and structure are designed for the severe landing load, so in a light condition, a load factor must be introduced to give required strength.

In the landing gear were used the shock of landing would strain the entire structure of the plane well beyond its elastic limit. It is therefore necessary to incorporate a shock-absorbing system somewhere in the chassis structure. This shock absorber dissipates the energy of landing, thus relieving the impact or shock loads. The total deflection of the chassis is between 4 and 6 inches. The term factor on landing thus giving an additional deflection, which must be taken into account when calculating the shock absorbing system. When the tire and shock absorber are fully deflected it is apparent that the chassis then has a different trend and the angles of the struts have changed, etc. The analysis of the chassis is usually made for this fully deflected condition.

It is important that all parts of the chassis be of newly equal strength. This is especially true of the wheels. In the case the ground reaction in the past is to design a good wing chassis, and then equip the plane with small wheels which have a rated strength well under the design value.

Requirements of the Commerce Department.

In chapter 2 the requirements of the Commerce Department are explained in detail. They will be reviewed here and the use of landing factors which have been revised since the publication of Chapter 2 will be repeated. It is to be noted that the distinction between open cockpit and cabin planes has been done away with and the factor on the right side has been increased. The table follows:

## Landing Factors for Landing Conditions

	Height of Free Drop for Static Factor	Height of Free Drop for Shock Factor
Class		
1000 lb. or less	5.5	24
1000 lb. to 10,000 lb.	5.5	20
10,000 lb. to 100,000 lb.	5.0	18
Over 100,000 lb.	5.0	15

For comparison the required load factor is 8.

The chassis shock absorber must be designed to absorb the energy corresponding to the free drop listed above without subjecting the chassis to forces greater than those corresponding to the load factors in landing. If the case of also possible type of absorber is used the required factor may be increased 50 per cent but no reduction in the height of free drop is allowable.

Landing Condition—The propeller axis is assumed horizontal and the base value of the vertical component of the resultant of the ground reaction is equal to the gross

weight at the airplane minus the chassis and wheels. The horizontal component is of the magnitude required to give the resultant force its specified direction—i.e., the direction of a line drawn through the center of gravity of the plane and the axis.

Landing Landing with Back Load—In addition to the loads based on the level landing analysis, the loads due to a side component must be added in this condition. This side component is to be taken as one-quarter the vertical component of the level landing condition, and is assumed to act at the ground. The tire is assumed to be deflected one-half of the nominal diameter of its cross-section.

Three-point Landing—The base value of the sum of the ground reaction is the gross weight of the airplane. The total load is divided between the chassis and tail and is in inverse proportion to the distances, measured parallel to the ground line, from the center of gravity of the airplane to the points of contact with the ground. The net base load on the chassis is equal to the total load on the chassis minus chassis and wheel weight. The loads are assumed to be perpendicular to the ground line in the three-point landing condition.

Design of Chassis Struts

When the strut is in pure tension or bearing the ultimate tension or modulus of rupture value of the material used is the allowable stress. Pure tension is pure compression, the Euler or Johnson curves for columns must be used. In most types of chassis there is one strut or wire which is in both tension and bearing. The sum of these two stresses must be within the modulus of rupture of the material. These stresses usually run very high and it is often necessary to use other steel treatments to 150,000 or 160,000 lb. per sq. in. ultimate strength. Occasionally a strut will be in combined bending and compression. In this case the required stress is the sum of  $S = My/I$  plus  $S = P/A$ . The allowable stress may be obtained from the formula expressed in previous chapters, namely:

$P = S_y(I/Mod. of Rupture - Y.P. in Comp.) + Y.P. in Comp.$

The values of  $I$  and  $A$  needed for the design of struts may be obtained from Tables 4 and 5 of Chapter 5.

Airplane Wheels.

At the present time the great majority of airplane wheels are made of wire. Disk wheels have been developed but at present are not widely used. The strength, weight, and important dimensions of commonly used standard wheels are listed in Table 16.

Table 16.—Properties of Standard Wheels.

Wheel Size	Weight Complete with Tire, etc.	Hub Length, Inches	Hub Dia., Inches
22 x 3	6,500	24	4.8
22 x 4	7,500	24	4.8
22 x 5	12,000	28	7.25

Continued on page 1404

# The Langley Field Maneuvers

Ninety Air Corps Planes take Part in Demonstration of Offensive And Defensive Value of Modern Military Aircraft

By EARL D. OSBORN

RECENT YEARS have not only brought about great changes in aircraft design but have also seen a very marked development in war strategy and tactics of air-to-air warfare. This was shown in a most interesting and effective fashion by the combined aircraft maneuvers which were held at Langley Field, Va., on May 4, and which gathered together aircraft groups from all over the country.

Langley Field, which is the home of the bombardment planes, is situated near Newport News and Fort Monroe. This locality has been a center of military activity and permanent garrisons far more than 200 years. The bombing section consisted of some 26 Keystone "Pitts" or L-10's. These planes which were built last year, are powered with two Liberty 400 hp. engines, carry a load of 2,000 lb. of bombs, and have a radius of 50,000 ft.

From Selfridge Field, Mich., came the pursuit group, flying 25 Curtiss "Hawks", which are powered with Curtiss D-32 engines. These planes are single seaters and carry two machine guns which shoot through the propeller. There is probably no group of pilots who equal the men from Selfridge in maneuvering while in formation.

From Texas came the attack group. This is a comparatively new, or rather, an underdeveloped branch of the air service, but in the maneuvers they gave a most interesting demonstration of their effectiveness. The planes, also built by Curtiss Aeroplane & Motor Co., Inc., carry six machine guns, two



A section of Langley Field, Va., as seen from the air.

on each wing, two in the gunner's cockpit, and two shooting through the propeller. They also carry a number of light bombs. These planes are used for attacking ground targets and fly very low, depending on their speed and light armor for protection.

The planes assembled at Langley consisted of 25 Pursuit, 23 Attack, 30 Bombers, 7 Observers, and 10 Transport; a total of 95 planes. This is not a very large number but it is practically the total number of planes which an organized unit would be able to go into battle on a day's notice. There were

also a number of older types of planes present, leaving a total up to over 150.

The ninety odd planes mentioned above are the tip-top of the development which is to take place under the development program. By 1937 there should be a total of 50 attack planes, 150 bomber planes, 420 observation planes, and 300 observation planes, with 1,500 flying officers and 13,000 men.



An view of the targets at Langley Field before the attack.

Also. Although there have been other concentrations of aircraft in previous years, this is the first one in which a task group has participated on a large scale and in which all the various kinds of offensive aviation have functioned together.

Besides the pursuit, bombardment, and attack planes, there are observation, training planes, and a few miscellaneous types such as transports. The training planes of course are used in actual warfare and the observation planes are used solely as sentinels in the ground troops. The maneuvers at Langley Field were meant to show to the officers of the various branches of the service what were the functions of observation of aircraft using as the offensive, and what would be necessary maneuvers to take against them. Involuntarily members of Congress and the press were invited to visit the maneuvers. Several squadrons of bombing planes were sent up to Washington to bring the guests to Langley and to return flights, which were in formation, given such a presentation of the skill required in this kind of flying.

Demonstrations were also held at Fort Snagg, N. C., Fort Benning, Ga., Fort Sill, Okla., Fort Riley and Leavenworth, Kan. These demonstrations away from the home base of standard training, as they are a nearer approach to actual war conditions.

The concentration at Langley Field was begun by an attack on a formation of bombers by pursuit planes. The attack took place over the field at an altitude of about 2,000 ft. The bombers flew in a very close wedge formation, with the leading planes somewhat higher than the next succeeding ones.

Continued on page 1357

# Aeronautics in Sweden

First Air Line, Stockholm-Helsingfors was Established in 1924 and Since that Time Considerable Progress has Been Made

By A. L. OLSON

During the first three years of its existence, aviation in Sweden has made gratifying progress. The service was inaugurated on June 2, 1924, with the opening of an air line between Stockholm and Helsingfors, Finland. Within a month another line was in operation between Malmö, on the southern tip of Sweden, and Helsingfors. From Malmö the line now extends north to include Gothenburg, Sweden's leading commercial port, and Oslo, the capital of Norway. Through three main air centers, Stockholm, Helsingfors and Malmö, Sweden today is in direct communication by air with the leading centers of Europe as far south as Paris and Lyons.

The Stockholm-Helsingfors route was popular from the first. Last October, an service was suspended for the winter season, the Swedish and Finnish companies announced that a two-day schedule was in prospect for 1925, especially during the height of the summer season. Such service with the permit of a flight, say, from Stockholm to Helsingfors and a return the same day. The route is one of the most beautiful in Europe. It passes above the headlands of islands that form the Stockholm straits, with only a 10 m. flight over open water before the islands of the low Finnish coast begin. The popularity of the route with tourists, as well as business men, accounts for the rapid increase in traffic from

these routes for mail service and regular transport of goods.

The figures that follow indicate the development during the three-year period—the number of passengers carried and the total in kilograms of freight and mail.

	1924	1925	1926	1927
Passengers	2115	10,500	12,000	12,500
Freight (kg.)	400	10,000	12,000	12,500
Mail (kg.)	277	10,000	12,000	12,500

From the first the Swedish company, A.-B. Transpost, realized that it would have to depend on government sub-



Map of Sweden's air lines and their connection with those of Europe (1927).

vention in part, a situation similar to that existing in many other European countries. The Swedish Company was first incorporated the 25th of December (1 Swedish krona = approximately 27 cents), later the sum was raised to one million. The government has lent its support with a subsidy of 100 kronor per kilometer flown and bonus for the purchase of "rolling stock." Last August the company submitted to the Swedish Parliament an estimate of 8,500,000 kronor as the amount needed for the first year 1925-26.

The planes selected for the service are the all-metal Junkers type, built in Sweden. For the regular passenger service the tri-engine plane, accommodating nine or ten persons, is used. The single engine plane is used for trial and special flights. The Swedish A.-B. Transpost, since several times, included on the all-metal Junkers as the planes that promised to ensure the greatest safety for the passengers.

Safety first is the keynote on which the whole Swedish air service operates. This is to be expected in a country where the railways have already made an admirable record, compared with railways elsewhere, for reduction of accidents. The report is attributed to take no risk. In an emergency, as is often the case, it is often the better part of wisdom to return to the starting-point. Delays are less serious than Swedish business resulting in loss of life.

Continued on page 1365



Flight picture of a Swedish Junkers air liner built at Lunds near Malmö.

1924 to 1926. In 1926 the total number of passengers carried was 100. In 1927 that total had been increased by more than 500.

Last 1-1, near the end of the season, Malmö reported that there had been a 90 per cent. increase of passengers carried in 1927 as against the number of the year before, a 400 per cent. increase in transport of freight and approximately a 300 per cent. increase in carrying of mail. From this very beginning of the operations of the Swedish lines, govern-

# The Lockheed "Air Express"

Latest Design of Lockheed Aircraft Co., is powered with a "Wasp" and Has a Speed of 167 M.P.H. with Full Load of 1000 Lb.

**P**RELIMINARY FLIGHTY tests were recently completed on the Lockheed "Air Express", the latest product of the Lockheed Aircraft Co., located at Burbank, Calif. The Air Express is an outgrowth of the original "Vega" design, which is the type of plane that Capt. George H. Sweeney used on his recent flight across the North Pole region.

The Air Express is an all wood monoplane with semicircular fuselage similar to the earlier Lockheed planes. The chief characteristic of the new plane is that it was designed to carry a Pratt & Whitney Wasp engine and has the tail end tapered forward so as to clear the fuselage on short center section views.

Most remarkable of all features of this new plane is the performance at 167 m.p.h. with full load of 1,000 lb. In the flight tests it was that a speed of 170 m.p.h. in level flight was easily attained. The cruising speed of the Air Express is set at 135 m.p.h. The Air Express will climb 1,450 f.p.m. at sea level and will climb to 13,000 ft. in 10 min. with full load.

The Air Express does not differ in construction from the Vega, having the same semicircular plywood fuselage which is formed in a great concrete mold under a pressure of 90 tons to the sq. ft. The construction affords excellent strength being and also leads itself to large scale production. For the benefit of those who may not remember the description of the Vega model, the Lockheed fuselage is constructed as two stretched parts which are later joined together top and bottom from nose to tail. The shell is formed of plywood veneer strips held in two diagonal braces, lateral and one longitudinal layer. Two coats of glue are applied and the layers are sealed into one unit shell of great strength by being placed in a large concrete mold and being subjected to a pressure of 50 tons per sq. ft. applied to an air bag in contact with the shell. This shell when assembled with the two large has no external bracing other than laminated wing leading

and secured at intervals to maintain the laminar air flow shape. These laminated wings are of greater strength in the points of stress where wing and engine mount are fastened. The engine mount is steel tube, while the wing is of aluminum. An aluminum tail piece is also used to complete it.



and wing of the Lockheed "Air Express" in three positions as shown at the rear of the fuselage. Windows and door are cut in the plywood and the openings so made are reinforced.

The wings of all Lockheed planes are of all metal structure with a hollow box spar with plywood skin to carry up to a built up three times as thick. The wing is made of plywood taking the drag load. Gasoline is carried in three wing tanks. Fuel's main forward has been incorporated in the Air Express, but the fact that the entire wing is set up about the top of the fuselage on two short struts with no tail bracing. The ailerons are fused into the wing.

All loops the lines and proportions of the Lockheed plane



Rear three-quarter view of the Lockheed "Air Express" powered with a Pratt & Whitney Wasp engine.

appeal the lighting on rising craft, this product has been designed primarily as a commercial machine and as of an especially sturdy construction. The wings have been specially made tested to 14,000 lb. and the fuselage is said to be designed to a very high safety factor. The safety of the Lockheed fuselage is said to be in the absence of any structural members, which might collapse and wreck the complete air in the characteristic of the plywood shell which will in itself absorb a shock at any point and exert a great resistance to collapse of the fuselage structure. An added factor is said to be incorporated into the design of the Air Express by placing the pilot in the rear and above the passenger's seating. In this position he is said to be the eyes and has clear and unobstructed vision in practically every direction.

## Fitted with Lockheed Hydraulic Brakes

Details on the Air Express are push and pull rods where possible, and are provided with inspection openings which instantly reveal them from mechanical external injury. As in the Vega model, the horizontal adjustable stabilizer is full rubber and is easily flared into the tail. The stabilizer has a self-contained divided trapezoid type. The wheels are tied with individual Lockheed hydraulic brakes.

The Air Express was designed to carry four passengers and sit in a compartment about at the passenger's feet. It is possible to increase either the passenger or mail capacity in the traffic version. Entrance to the passenger cabin



Side view of the Lockheed "Air Express".

is a large door on the left hand side of the fuselage. The seats have been designed as the passenger compartment, the seats inside as the compartment are well padded and easily adjusted to various positions, the floor is carpeted, and each seat has an ashtray for each entrance and exit. The passenger cabin has a dome light installed in the ceiling and in places is equipped for night flying. Ventilating windows in the fuselage are provided in the passenger cabin, the entire plane being in a position for rapid air travel. The cabin is built from the exterior, which is sealed, making the in-

terior of the cabin pleasantly quiet while in flight. The Lockheed type of construction is the result of many years of development work. No expense has been spared to learn the best method for the strengthening of every detail of construction. The result has been the perfecting of every



Interior view of the well upholstered cabin of the "Air Express".

single of factory production to the point where quantity schedules may be incorporated without affecting the high quality of workmanship. The Lockheed factory is now dropping production up to three planes a week, less than 500 men on the production line, and is erecting a new factory building that has been designed from start to finish as efficient mass production.

Great strides are being made at the present time through the use of accurate patterns and jigs which simplify and speed assembly. Tools and jigs have also been developed for the metal working and welding, while the great fuselage molds make rapid production of complete shells comparatively simple.

In the assembly room the workmen have been provided with special men's strip holders, overhead lifting machines, extending lights and rapid electrical drills and finishing tools while the final assembly line jigs are carried upon portable cradles which are erected at the most advantageous points. The result of this organization of every phase of manufacturing is, says the most ardent and perfect product that it is possible to build.

The manufacturer's specifications of the Lockheed Air Express are as follows:

Wing span	34 ft.
Length	27 ft. 5 in.
Wing area	58 to 100 sq. ft.
Engine	2 to 4 persons
Passenger capacity	140 gal.
Fuel capacity	16 gal.
Oil capacity	1,000 lb.
Max. load (maximum gross weight)	410 lb. Pratt & Whitney Wasp
Engine	Reliance Electric and Bond Motors

Continued on page 1381



## New Nine Cylinder Radial Engine Developed By Capt. R. W. A. Brewster Is Block Tested

CAPT. R. W. A. BREWSTER has developed a nine cylinder, air cooled, radial engine with the unusual feature of Harold F. Pitzner, president of Pitzner Aviation, Inc., of Philadelphia, Penna. The engine has been block tested and is rated at 164 hp at 1800 r.p.m. It weighs 145 lb. complete with all accessories including starter. Under full load, at rated speed, the fuel consumption is .47 lb. per hp. hr. which is equivalent to about 14.5 gal. per hp. hr. This figure is very low for full power performance.

The engine has conventional design having nine, fixed radial cylinders of cast iron with a bore 4 1/2 in. The cylinders are bolted directly to the crankcase by four studs. They were designed with hemispherical heads having both intake and exhaust overhead valves in the rear. All valves are actuated by push rods driven from a single cam ring in front of the crankcase. The upper ends of the push rods are housed in an aluminum box protecting the rocker arms and valve mechanisms. The lower lever can be adjusted without removing the box cover.

### Uses Normal-Hoffman Bearings

The pistons are aluminum alloy with dished heads. They drive the connecting rods made of duralumin forgings. The master rod is a single piece incorporating a two piece crankshaft. The crankshaft is mounted on two Normal-Hoffman roller bearings while a larger ball bearing takes the propeller load.

All accessories, except for the valve mechanism, are carried in the rear. These include a French carburetor mounted below the engine and connected to a rotary diffuser driven directly from the crankshaft. Also mounted on the so-called accessories carrier, are two Bendis magneto driven indirectly by two gears meshing with a pinion on the end of the crankshaft. These gears drive the timing and pump, oil pressure pump and sea scavenger pump. A third gear meshing with this pinion is connected to a mount for an Elcupo starter.

Though these engines have performed very well under tests they are not yet in production and plans for their manufacture have not yet been announced.

## Chicago-Atlanta, St. Louis-Kansas City, and Michigan Air Mail Route Bids are Opened

BIDS FOR three additional air mail routes were recently opened in the office of General Assistant Postmaster General W. Irving Glover. The first of these routes will run from Chicago, Ill., to Atlanta, Ga., via Terre Haute, and Evansville, Ind., Nashville and Chattanooga, Tenn., with a stop from Evansville to St. Louis, Mo., giving the latter city a connection with Atlanta and later with Florida and Cuba.

The second route will extend from St. Louis to Kansas City, Mo., and Omaha, Neb. The schedule, which will not approximate with the Emoryville, La. route.

The third route will cover the State of Michigan like a blanket, moving from Chicago, Ill., to Kalamazoo, Mich., via South Bend, Ind., to Bay City via Leavenworth, Flint and Saginaw, with stops including all from Kalamazoo to Pontiac, via Battle Creek, Jackson, Ann Arbor, and Detroit, and to Warrenton, via Grand Rapids.

Bids received on the Chicago-Atlanta route were as follows: United Airways, Inc., Detroit, Mich.: \$2.50 per lb. Robert L. Hyman, Harshe, Ill.: 80 cents per lb.

Page J. Thibodeaux and Joseph H. Cory, Lake Forest, Ill.: \$1.45 per lb.  
Beverly Aircraft Corp., Chicago: \$2.02 per lb.  
Egyptian Transportation System, Marlon, Ill.: 1.50 cents per lb. (mail saving from \$1.80 to \$2.80 per lb.)  
E. W. Bollerger, Atlanta, Ga.: \$1.65 per lb.  
The following bids were received on the St. Louis-Omaha route:

Robertson Aircraft Corp., St. Louis: 79.5 cents per lb.  
Albert Von Hoffman, St. Louis: \$2.45 per lb.  
Beverly Air Transport, Inc., Seattle, Wash.: \$1.50 per lb.  
Watson Air Express, Inc., Los Angeles: \$1.96 per lb.  
Bollers on the Chicago-Michigan route made was: Thompson Aeronautical Corp., Cleveland, O.: 80 cents.  
Walter T. Varnay, Wilmington, Del.: \$2.23 per lb.  
United Airways, Inc., Detroit, Mich.: \$2.75 per lb.

## Ralph A. Beale of Beale Aircraft Co.

### Brings Out New Monoplane in Kansas City

A NEW airplane factory has been started in Kansas City by Ralph A. Beale, president of the Beale Aircraft Co. A new plane, with several distinctive features, designed by Mr. Beale, will be placed on the market by the company.

The machine, a monoplane with an OX-5 motor, could go, has a cabin for two passengers and a pilot. In its first flight Mr. Beale, who was a war pilot, won 13,500 ft. in 25 min. Another test was made by Blaine M. Tuckervan, commercial pilot, who took the plane up with a full load 3800 ft. with only one circle of the field and a short take-off.

The expansion division of the Chamber of Commerce is taking an interest in the new plane and cooperating in the establishment of the factory. The plane is to be sold, it is said, for \$2,400.

## Stinson Company Delivering First of Six Planes Ordered by Mexican Government

THE FIRST of six Stinson monoplanes ordered by the Mexican Government in March to be used on the air and in the Mexican Civil War and Laredo, Tex., has been turned in by the factory at Detroit for immediate flight delivery and according to William A. Marx, secretary of the Stinson company.

The plane is being flown to Mexico City, where the pilot will be selected, will remain to instruct the Mexican pilots flying the plane. The first remaining plane of the order will be flown only in Laredo, Tex., where Mexican pilots will be flown over. The order for these planes came from Mexico on the day Eddie Stinson and George Holloman broke the world's endurance record at Jacksonville, Fla.

## Miss Rasche's Order for a Trans-Atlantic Plane Is Rejected by the Stinson Company

BECAUSE of the policies of the company favoring the manufacture of Stinson planes intended for length and speed, the Stinson Aircraft Corp. of Detroit, Mich., recently returned a check for approximately \$4,000 to Miss M. Rasche, German aviator, as a deposit on a Stinson monoplane to be used on a proposed trans-Atlantic flight in 1936.

William A. Marx, secretary of the company, said Miss Rasche has been promised a Stinson plane, the "Stinson" from Louis Stinson, New York City, who bought the plane from the Detroit company last summer for an endurance attempt. The Stinson company has rejected a number of proposals, Marx said.



Fokker  
Super Universal

ANTHONY H. G. FOKKER speaks with authority. His long experience as a master builder of airplanes is reflected in this letter:



Fokker  
Standard Delivery



Model's Valspar  
Fokker made the long and quick trip over the Pacific—also from the mainland to Honolulu.



Fokker  
Universal Engine



A Fokker Superplane—Valspar  
It must be built of it—strong, good and weather-proof.



Fokker  
V-10



Fokker  
Universal Engine

# Fokker

USA

## has used VALSPAR for 10 Years

ATLANTIC AIRCRAFT CORPORATION

The Corporation of  
Holliston, Michigan, U.S.A.  
Incorporated in 1925

VALSPAR is the standard for all aircraft construction. It is the only material that is strong, light, and easy to work with. It is the only material that is not affected by moisture, salt, or acid. It is the only material that is not affected by fire. It is the only material that is not affected by insects. It is the only material that is not affected by time.

At the time the Atlantic Aircraft Corporation was founded, it was the only company in the world that was using Valspar. It was the only company that was using Valspar for the construction of aircraft. It was the only company that was using Valspar for the construction of aircraft. It was the only company that was using Valspar for the construction of aircraft.

VALSPAR is the standard for all aircraft construction. It is the only material that is strong, light, and easy to work with. It is the only material that is not affected by moisture, salt, or acid. It is the only material that is not affected by fire. It is the only material that is not affected by insects. It is the only material that is not affected by time.

VALSPAR is the standard for all aircraft construction. It is the only material that is strong, light, and easy to work with. It is the only material that is not affected by moisture, salt, or acid. It is the only material that is not affected by fire. It is the only material that is not affected by insects. It is the only material that is not affected by time.

## REVIEWS

The First Department, Aviation, 215 West 55th St., New York City are among the units mentioned above previously. Publications may be obtained upon request from the Aviation Division, Department of Aeronautics, Washington, D. C.

Army Air Corps Information Circular No. 595. Design of Internally Bowed Wings by E. C. Fiala.

The report includes the design and stress analysis of a typical tapered wing. The complete analysis of the Half-Delft AT-1 training plane was carried through with lift stresses and exhaust shocks also analyzed. The attempt is made to describe methods of detail design but to merely compare the dimensions of the internal sections of the internally bowed wing structure.

Army Air Corps Information Circular No. 602. Determination of Stresses in Landing Gear and Design of Shock Absorbing Units Part I by Theo. de Port.

The report deals with the design of shock absorbing units and with methods for the determination of distribution of landing gear loads already designed. Types of shock absorbing units considered are: tires without any other shock absorber and tires and rubber chord in tension.

Aircraft Year Book, 1928, published by the Aeronautical Chamber of Commerce, New York City, 356 pages \$5.25.

The book contains a review of the annual recording or aeronautical progress for the past year, contains a review of the aeronautical progress, and contains a review of the aeronautical progress. The book contains a review of the annual recording or aeronautical progress for the past year, contains a review of the aeronautical progress, and contains a review of the aeronautical progress. The book contains a review of the annual recording or aeronautical progress for the past year, contains a review of the aeronautical progress, and contains a review of the aeronautical progress.

Under "Airports and Airways" are listed the lighted and navigated airports by states. Airship and balloon developments, races and records are described followed by a chapter on aeronautical education in the United States. There is a chapter on foreign nations and the progress in each country. This is followed by an international aeronautical bibliography. There is a chapter on technical developments and another on the aeronautical industry living the activities of each country. This is followed by a section containing drawings of airplanes, engines and accessories. The appendix includes lists of pilots, operators, aviation standards of some nations, airport managers, as well as statistics and data on air races, records, competitions, air mail operations, Department of Commerce, Army, Navy, production, etc.

M.A.C.A. Report No. 293. The Performance of Several Combustion Chambers Designed for Aircraft by Engineer by William F. Jacobson and Corinne Kemper. Several investigations have been made on single cylinder test engines to determine the performance characteristics of four types of combustion chambers designed for aircraft use. Two of the combustion chambers studied were both type pressure-

ten chambers, the remaining engine of one having been designed to produce high turbulence by tangential air flow in both the precombustion chamber and the cylinder. The other two were integral combustion chambers, one being bowl-shaped and the other piston-shaped.

The injection systems used included one and another a few fuel pumps, and dampers and connections and fuel injection valves. The data presented show the performance of the engines from 1000 to 1200 r.p.m. The results obtained in these tests showed that the engines with suitably designed combustion chambers and fuel injection systems may be operated at speeds around 1,000 r.p.m. without encountering excessive explosion pressure.

At a speed of 1,000 r.p.m. and with a fuel quantity giving 15 per cent excess air in the cylinder, a maximum output of 100 h.p. per sq. in. was obtained with a fuel consumption of 0.45 lb. per h.p. per hr. A minimum fuel consumption was 0.30 lb. per h.p. per hr. A minimum fuel consumption of 0.25 lb. per h.p. per hr. at an output of 85 h.p. per sq. in. and 1,000 r.p.m. was obtained with a cylinder head being a half-type pressure-chamber. The maximum cylinder pressure was 500 lb. per sq. in. The best performance in the tests reported was obtained with a half-type combustion chamber designed to give a high degree of turbulence within the bowl and cylinder.

## Aircraft Patents

Patent No. 1,639,125—GAS-INDICATED AIRSHIP. Edward Kenneth Tracy, Chicago, Ill. (assignor to Lakeside Aero. Bureau, Des Moines, Iowa). This invention relates to a gas indicator for an airship, comprising a structure adapted to be inflated with gas, a valve to permit the gas to enter or leave the structure, and a device for measuring the pressure of the gas within the structure.

Patent No. 1,639,126—AIRSHIP. Edward Kenneth Tracy, Chicago, Ill. (assignor to Lakeside Aero. Bureau, Des Moines, Iowa). This invention relates to an airship, comprising a structure adapted to be inflated with gas, a valve to permit the gas to enter or leave the structure, and a device for measuring the pressure of the gas within the structure.

Patent No. 1,639,127—AIRSHIP. Edward Kenneth Tracy, Chicago, Ill. (assignor to Lakeside Aero. Bureau, Des Moines, Iowa). This invention relates to an airship, comprising a structure adapted to be inflated with gas, a valve to permit the gas to enter or leave the structure, and a device for measuring the pressure of the gas within the structure.

Patent No. 1,639,128—AIRSHIP. Edward Kenneth Tracy, Chicago, Ill. (assignor to Lakeside Aero. Bureau, Des Moines, Iowa). This invention relates to an airship, comprising a structure adapted to be inflated with gas, a valve to permit the gas to enter or leave the structure, and a device for measuring the pressure of the gas within the structure.

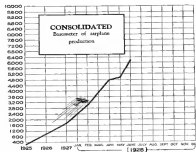
Patent No. 1,639,129—AIRSHIP. Edward Kenneth Tracy, Chicago, Ill. (assignor to Lakeside Aero. Bureau, Des Moines, Iowa). This invention relates to an airship, comprising a structure adapted to be inflated with gas, a valve to permit the gas to enter or leave the structure, and a device for measuring the pressure of the gas within the structure.

Patent No. 1,639,130—AIRSHIP. Edward Kenneth Tracy, Chicago, Ill. (assignor to Lakeside Aero. Bureau, Des Moines, Iowa). This invention relates to an airship, comprising a structure adapted to be inflated with gas, a valve to permit the gas to enter or leave the structure, and a device for measuring the pressure of the gas within the structure.

Patent No. 1,639,131—AIRSHIP. Edward Kenneth Tracy, Chicago, Ill. (assignor to Lakeside Aero. Bureau, Des Moines, Iowa). This invention relates to an airship, comprising a structure adapted to be inflated with gas, a valve to permit the gas to enter or leave the structure, and a device for measuring the pressure of the gas within the structure.

Patent No. 1,639,132—AIRSHIP. Edward Kenneth Tracy, Chicago, Ill. (assignor to Lakeside Aero. Bureau, Des Moines, Iowa). This invention relates to an airship, comprising a structure adapted to be inflated with gas, a valve to permit the gas to enter or leave the structure, and a device for measuring the pressure of the gas within the structure.

THE accompanying chart illustrates the continued growth of airplane production . . . and the present approximate rate of manufacture (planes per 12-month period) . . . as indicated by the current delivery schedule of Consolidated Instruments



## Consolidated Instruments are Standard on the Sikorsky Amphibian

TYPE F Sea Scout amphibian has complete dash including such easily accessible compensating set.

### CONSOLIDATED INSTRUMENTS

Altimeters  
Tachometers  
Oil Pressure Gauges  
Compasses  
Temperature Gauges  
Air Speed Indicators  
Gasoline Gauges  
Indicometers  
Navigation Lights  
Landing Lights  
Dash Lights

CONSOLIDATED tachometers, altimeters, air speed indicators, oil pressure gauges, temperature gauges—and also Consolidated navigation lights—are standard equipment on the beautiful Sikorsky Amphibian, one of America's most distinctive planes.

Quantity production, resulting from the fact that one or more Consolidated Instruments is standard equipment on most American commercial airplanes, makes possible the moderate prices of our dependable quality products.

## CONSOLIDATED Instrument Company of America, Inc.

41 East 42nd St., New York

Western Representative

M. E. Hulse, 1391 Broadway, Oakland, Calif.

CONSOLIDATED  
Type A  
dash instrument  
and Type A  
dash instrument  
shown in  
this picture

## Champion Spark Plug Co. of Toledo, O., Brings Out a New Aircraft Engine Plug

THE CHAMPION Spark Plug Co., Toledo, recently announced the development of a new aviation spark plug, the AE-6. The plug was designed by O. C. Rohde, chief engineer for the company. It was designed for operation under extreme conditions such as sudden changes from part to full throttle, spooling off and back full throttle as in certain maneuvers, varying weather conditions, etc. The plug employs advances to overcome the objections to previous. This material is said to be exceptionally hard and strong and the plug is so designed that should it break, it will still hold together and continue to function. In the AE-6 there have been incorporated some new principles of core design. In place of the standard straight tap with the electrode extended through the plug's outer length, the AE type was two pieces of porcelain. The first is a primary core with sufficient electrical clearance at the top to be safe. The second is a protecting and covering dome of alumina which encloses the primary core and, in addition, adds to its insulating length.



The new Champion Spark Plug.

length.

Representative plugs of this design have been in use for some time. They were in the Wright Whitebird engines of the "Travel Air" monoplane used by Smith and Brooks on their flight from San Francisco to Hawaii last summer and by Marine Jensen who finished the Solo France flight to Hawaii. Last year Maj. Mario de Bernardi used these plugs in a Macchi Fiat plane when he set a world's speed record in Venice, Italy. In December Maj. Renato Donati established a world's altitude record using a Romeo-Jupiter engine with Champion spark plugs.

## Jacques Schneider, Seaplane Race Trophy

Donor, Dies at Beaulieu-sur-Mer, France  
REPORT ELAS has received from France that Jacques Schneider, French sportsman, who donated the international seaplane speed trophy which is named after him, died on May 1 at Beaulieu-sur-Mer. He was 30 years old.

M. Schneider presented the trophy cup to the Aero Club of France in 1912 for the purpose of developing marine aircraft through competition among the nations in annual races. Marcel Fournet of France first won the Schneider Cup when he attained about 69 m.p.h. in 1913. England took the cup the following year.

During the war, the races were suspended as the bays again were in 1921, but England regained the cup in 1925 only to lose it in 1927 to the United States. The race was awarded in the year that followed because the English and British airmen were unable to get their planes ready in time.

In 1928 Lieut. James Doolittle, United States Navy, kept up Schneider Cup in this country by turning in a speed of 222.67 m.p.h. De Bernardi of Italy surpassed this mark by flying 236.48 m.p.h. in 1929 to take the cup. The trophy is

now held by England, Lieut. E. H. Webster having flown 281.48 m.p.h. at Venice last September.

Since the last race, Major de Bernardi of Italy has been credited with two seaplane speed marks bettering that of Webster. On Nov. 3, 1927, de Bernardi flew 295 mph, and on March 30, 1928 he attained 316.37 mph over the Lido course at Venice in his Macchi M.52 Fiat seaplane plane.

## Howard Woodall Flying an OX-5 Travel Air Is High Point Man in Dallas, Tex., Meet

A TWO day air meet recently held in Dallas, Tex., proved successful despite inclement weather which prevented several visiting planes from arriving for the competition. About 15,000 spectators were attracted to the field on the opening day.

Howard Woodall piloted his OX-5 Travel Air to high honors by making the greatest number of points during the two days. In every event in which he entered, Woodall placed first. The \$1,500 in prize awards was distributed among winners in the various events, who placed as follows:

- 1st. (1st) Howard Woodall, Dallas, OX-5 Travel Air.
- 2nd. Louis E. Dierberg, Abilene, OX-5 Travel Air.
- 3rd. Howard Woodall, Dallas, OX-5 Travel Air.
- 4th. Ross Arnold, Fort Worth, OX-5 Travel Air.
- 5th. Landing Contest. (13 entries)
- 1st. Howard Woodall, Dallas, OX-5 Travel Air.
- 2nd. Ross Arnold, Fort Worth, OX-5 Travel Air.
- 3rd. Marshall Brock, Dallas, OX-5 Jumbo.
- Free For All Race. (Six entries)
- 1st. Jack Lamer, Sherwood, Yough 7E-6, Ibis.
- 2nd. Roy Robinson, Fort Worth, Whitcomb Ryan Brougher.
- 3rd. Al Rieley, Fort Worth, Hall Denny (Big Destroy).

Horse Aerobatics. (Six entries)
- 1st. (1st) Marshall Brock, Dallas, OX-5 Jumbo.
- 2nd. Herbert Knudsen, Dallas, OX-5 Travel Air.
- 3rd. Howard Woodall, Dallas, OX-5 Travel Air.

The OX-5 Dallas pilot was a 12 year old boy, Charles Marshall, flying an OX-5 International. He stepped away before his name was obtained. The meet was closed with a balloon ascension by R. M. Doolittle.

## New Three Place Biplane Using the OX-5 Is Built by M. C. Arnold in Athens, Ga.

A CONVENTIONAL three place biplane has been completed at Athens, Ga., and has been tested and found to be exceptionally stable. The plane was designed by A. H. Conner and built by M. C. Arnold of that city. It is an open cockpit design powered with an OX-5 engine. In construction, it has a welded steel tube fuselage and tail section while the wings are of wood covered with fabric. A through axle type of landing gear is used with the main gear below the fuselage and braced to the landing gear struts. The plane is stated to weigh 1150 lb. empty and 1750 lb. loaded and to have a top speed of 95 m.p.h. with a landing speed of 35 m.p.h.

## Lunkheimer Company of Cincinnati, O., Publishes Booklet on Aircraft Fittings

"LUNKHEIMER Air Craft Fittings" is the title of a small book now being distributed by the Lunkheimer Company of Cincinnati, O. It gives complete accompanying information and drawings showing the principal dimensions of the various types of Lunkheimer aircraft fittings which include all kinds of pipe fittings, pressure fittings, short-cut codes, and drain codes.



## Fokkers for Success!

IT is not a coincidence that the most successful air line has Fokkers. Since over their success to the fact that they equipped themselves with the dependable Fokker from the start. Others have achieved success through sound judgment and good management in their operations, and then this same leadership points the way to the purchase of the latest Fokker Aircraft.

Notable examples, in widely different fields, are the Western Canada Airways, Ltd., of Winnipeg, Minnesota, and the Pan-American Airways, Inc., of Key West and Havana. Both use Fokker Aircraft!

And now, Western Air Express, the greatest demonstration of the growing possibilities of air transportation, adopts the new Fokker Super-Trimotor F-10, the greatest Fokker ever built.

... under the equipment loan made by the Daniel Guggenheim Fund for the Promotion of Aeronautics.

The new Fokkers are winging their daily schedule between Los Angeles and San Francisco, carrying 14 people, full main equipment, baggage and 700 lb. of mail, in luxury and safety, at major airport speeds.

Making 170 miles an hour under the full power of its three Pratt & Whitney "Wasp" engines, over 120 miles an hour at that reduced throttle which means complete reliability and maximum wear and tear, and 1,400 feet per minute climb with full load; such performance sets in the Fokker F-10, new standards for the world fast to gaze at, then to follow.

Specification on Executive Request

ATLANTIC AIRCRAFT CORPORATION

Factory and Flying Field  
Trenton Airport, Hudson County, New Jersey

Sole Agency of FOKKER AIRCRAFT CORPORATION of America, Washington, West Virginia





## New Light Biplane With Cantilever Wings Built in England by George Parnall & Co.

A BOMBAYAT monocoque light plane was recently completed by George Parnall & Co., Hinxley, England. The "Imp," as it has been named, is a biplane powered with a 45 hp. Armstrong-Siddeley Gem engine. It is entirely of wood construction with cantilever wings. The plane weighs 550 lb. empty and 1,320 lb. loaded. It has a high speed of 100 m.p.h. with a landing speed of 40 m.p.h.

The most radical feature in the construction of the plane is the wings. They are of cantilever design with the lower wing built in one piece and supporting the upper wing which is built in two pieces hinged at the center section. The upper wing has a considerable sweep back, approximately 15 deg. in addition to a large cut out where the panels are joined. This makes for excellent vision through it, compensates construction and gives the plane a somewhat aerodynamic appearance. The wings themselves, which are of the R.A.F. 31 section—a fairly flat section with the center line curved in a shallow arch—have four foot chords. The covering is a spruce veneer, varying in thickness according to the stress and covered with uncolored fabric protected with paint. The



The "Imp," new English light plane powered with 45 hp. Armstrong-Siddeley Gem engine.

torally there are a number of light struts replacing the usual two spar construction. Replacing the conventional type of ribs are riveted plywood frames spaced according to the load stress in such a way as to make the suspension loose. Release of the deflection in making stress adjustments for the type of struts a number of levers were made to determine the best spacing for the ribs and the proper thickness of the covering. The upper wing is tied to have a load factor of 12 and the lower wing about 6. The wings do not fold but may be easily lifted off by two people in a few minutes. There is no wing bracing and the only struts are the angle tension member on each side.

### Used British Fuselage Construction

The construction of the fuselage follows usual British practice for planes of this type. It has four square longbones with the sides covered with plywood. Both sides and the bottom are cut wide the top is covered with a light struts above the upper longbones. The upper longbones are quite thick making for a deep fuselage. The two sides are joined to the bottom with the forward one slightly behind the trailing edge of the upper wing. Both cockpit are fitted with stick control, the controls of the rear cockpit being connected directly to the ailerons which are on the lower wing only. These surfaces extend the entire span of the lower wing and like the tail surfaces are of wood cut.

The five cylinder, star rated, Armstrong-Siddeley engine is mounted on the axis of the fuselage on a frame supported by square tubes braced with angles. In the fitting in front of the forward cockpit is the main fuel tank feeding to the engine by gravity.

The landing gear is of the through axle type with the shock

absorbers consisting of a coil-spring also and helical spring steel. The travel is about five inches and the tread is 2 ft. 1 in. The span of the Parnall Imp is 23 ft. 6 in. for the upper wing and 21 ft. 4 in. for the lower wing. The area of the wings is 176 sq. ft. including the ailerons which have an area of 33.7 sq. ft. The overall length of the plane is 30 ft. 2 in. and it stands about 7 ft. 9 in. with the tail wheel on the ground.

## Newly Approved Kinner K-5 Radial Engine To Be Eligible in National Air Meet Race

FOLLOWING WORD that the Kinner K-5 100 hp. radial aircraft engine had successfully passed the 50 hr. endurance test specified by the new regulations of the Department of Commerce, it has been announced by Dr. W. C. Young of the Kinner engine will be eligible for all races at the National Air Meet in Los Angeles during September for engines of the 100 hp. class.

In a telegram from the Bureau of Standards, Washington, D. C., Leslie Bevan, Kinner test engineer, referred to the fact that the Kinner engine had successfully passed the test run of 50 hr. The first five hours were run at 120 percent of the maximum rated speed and 100 percent of the maximum for 45 hr. more at 100 percent of the maximum speed. The run was completed without a forced stop and with only 12 repairs, most of them minor.

According to Francis Draxler, assistant manager of the Kinner factory, several orders have been wired to the Glendale plant since the successful completion of this test. In order for 30 engines were from the Taylor Brothers in Southbury, Connecticut, N. Y., and a test order was placed by the American Eagle Airplane Co. of Kansas City.

## Beacon Airways, Inc., Los Angeles, Plans Establishment of a Large Flying School

PLANS FOR establishment of one of the largest flying schools in the country were recently announced in Los Angeles by W. H. Franklin, president of Beacon Airways, Inc., a company with offices in Los Angeles, Fresno, San Francisco and Wichita, Kas. Immediate development of a large field on Main Drive is now under way and it is at the 10 that the new flying school is projected.

Beacon Airways now distributes the Cessna multi-engine airplanes and the in-engineered President airplanes in the State of California. The company is also expanding with a new two passenger sport planes in an effort to offer the flying public a plane in every price class. The new plane is called the "Aster" and is said to have performed satisfactorily on test flights. It has a wing spread of 21 ft. and a total weight of 600 lb.

## Alexander Milburn Co., of Baltimore, Md., Develops New Cutting and Welding Torch

THE ALEXANDER Milburn Co., Baltimore, Md., has developed a new cutting and welding torch that can quickly be changed from cutting to welding without changing the tip. The new device features the 72 inch tip of the torch. It is in such position the gas is automatically passed through the preheating passages while the back pressure is carried directly to the control box for safety. In the other position, made by a quarter turn of the tip, the cutting oxygen is cut off and the welding gas is carried through the central passage of the cutting tip, under a welding flame. Thus, this one torch can be used for both cutting and welding with practically no loss in time in re-charging. The tip is so designed that when it has cooled its usefulness for cutting it can still be used for welding.

# New Champion Aviation spark plug Revolutionary in Principle and Design



ENTIRELY new principle of design • Exclusive silicomica insulation—the finest insulating material known • Double insulation—primary protected by secondary "dome" insulator • Cooling area around insulator • Champion two piece construction. Absolutely gas-tight against the highest compression ratio • Heavy structure is designed that the insulator cannot be broken in such a way as to interfere with engine operation.



THE new Champion Aviation spark plug is not only a distinct innovation but is actually revolutionary in principle and design. It has already established new standards of spark plug performance in aircraft engines.

The unique design of the exclusive silicomica insulator, in which the primary is protected by the secondary "dome" insulator, provides protection and cooling areas impossible in ordinary spark plugs. The entire structure is so designed that it positively cannot be broken in such a way as to interfere with engine operation. Pre-

ignition and "cutting out" are practically impossible.

Developed after two years of painstaking research and rigorous tests, the new Champion Aviation spark plug further embodies all the excellence in material and manufacture exclusive to all Champion spark plugs.

Install a complete new set of Champion Aviation spark plugs which bring to your engine a new factor of safety and vastly improved performance and dependability.

Write for descriptive folder

# CHAMPION Spark Plugs

TOLEDO, OHIO

Circle 100 for marketing ATTENTION

## General Nobbe at Kings Bay, Spitzbergen. Ready for Arctic Flights in the "Italia"

HAVING LANDED his semi-rigid dirigible "Italia" at Kings Bay, Spitzbergen, on Monday May 6, Gen. Cesare Nobbe is now preparing for several flights into the North Pole region following a program which will consume the remainder of the spring and a large part of the summer.

The purpose of the flights is to gain a more scientific knowledge of the Arctic weather of the globe. A search is to be made for Crocker's Land, a tract which MacMillan was re-



The "Italia" in its hangar just outside of Rome, before the flight north

able to find in 1914 though Peary believed he discovered such a section in 1909, and another flight will be made in the opposite side of the Pole to learn, if possible, more about Sub-cities 11. Lead north of the peninsula of Taimor, which was discovered by a Russian expedition under Captain Wilkies in 1901.

Nobbe's last leaving ship Citta di Milano arrived at Kings Bay, Spitzbergen, on Wednesday May 2. This ship will be used as a base from which the various flights will be made. The Italia will carry a score of men on the expedition, many of whom will be veterans of the Antarctic Ellsworth-Nobbe flight over the North Pole in 1925 in the "Norge". The Citta di Milano will carry a large crew of men for the handling of the dirigible.

### Stormy Weather Encountered

Much stormy weather has been encountered by General Nobbe in his flights from Milan, Italy, to Spitzbergen. Early April 15, the Italia left Duggio Field, near Milan, and was headed toward Venice, Trieste, and Prague on its flight to Rudolfsheim. Stormy weather, especially characterized by strong head winds which lowered the speed of the dirigible to 15 m.p.h. in some sections, was met en route. The normal cruising speed of the Italia is 62 m.p.h.

After leaving his way over Bremen, Goshardovitz, and again finding his course from radio reports, General Nobbe continued his journey and landed at Rudolfsheim, near Rudolfs, on April 25. The 680 mi. flight had taken 30 hr. 40 min.

A two week's halt followed; then on May 3 the trip north was continued with a 1,500 mi. flight of 29 hr. duration to Vadsø on the northern coast of Norway. In his last, Nobbe was again lost, this time over the Gulf of Bothnia. Re-

searched for several hours, it is reported, until the entire gas envelope was lost in the fog. The envelope of the Italia was slightly damaged on landing at the morning mist at Vadsø. With the envelope repaired, the General continued on May 5 to Spitzbergen, where he landed next day. This flight of 680 mi. was made in 16½ hr.

## Robertson Aircraft Corp. and Thompson Aeronautical Corp. Get Mail Contracts

POSTMASTER GENERAL New has awarded to the Robertson Aircraft Corp. of St. Louis, Mo., the contract for carrying the air mail route from St. Louis, via Kansas City, Mo., to Omaha, Neb., and return. The bid of this firm was the lowest received, was for \$75,000 a year. This is the lowest rate for carrying the mails over any route presented in existence, and, in the opinion of the Postmaster General, indicates that the business of carrying the mails by air is becoming a profitable one to private contractors.

The Thompson Aeronautical Corp. of Cleveland, O., was also awarded the contract for carrying the mails by air on the route from Chicago, Ill., to Kalamazoo, Mich., via South Bend, Ind., to Bay City, via Lansing, Flint and Saginaw, via spurs branching out from Kalamazoo to Pontiac, via East Grand Rapids, Ann Arbor, and Detroit, and to Muskegon via Grand Rapids. The bid of this firm was \$8 cents a pound and was the lowest received by any of the companies submitting bids.

The route from St. Louis to Omaha will not be placed in operation for several months as it will require the lighting of the airway for night flying. The route from Chicago to Indiana and Michigan points will commence operation during the early part of the summer or just as soon as the contractor can make arrangements for landing fields and place in equipment in addition for mail carrying.

## New Type of Wind Indicator is Installed At the Oakland, Calif., Municipal Airport

AN UNUSUAL type of wind indicator has been installed at the Oakland Municipal Airport, Oakland, Calif. It is shaped like a small megaphone, has a wing spread of 12 ft., a 24 ft. fuselage, and is ceiling with 1000 ft. high. The megaphone is mounted on a 30 ft. tripod, over the downwind corner which is located in the southeast corner of the field. The new lights make the indicator visible at night for many miles, and it can be seen through a fog from a 1,000 ft. altitude.

Members of the Oakland port commission ordered installation of the indicator, and the contract for designing and constructing the novel equipment was given to the Aircraft Industries, San Leandro. Other airports are expected to adopt the new style vane.

## DH Moth With Slotted Wings is Displayed By Air Associates, Inc., at Curtiss Field

AIR ASSOCIATES, Inc., of New York City has purchased a DH Moth plane equipped with slotted wings and is exhibiting it at Curtiss Field, E. 1, N. Y. Mr. Handley-Pop now visiting in America, has visited the field and explained the use of the slotted wing device to a few who have viewed the plane.

It is understood that Air Associates, Inc., plans to enter the Moth in the 1928 Ford Reliability Tour with James E. Taylor as pilot. The company's price for the plane is \$5,000.



THE Boeing Airplane Company is planning for that time, which is eventually coming, when airplanes will be an accepted mode of speedy transportation, rather than the unusual. A staff of fifty to sixty aeronautical engineers, constantly employed in research, gives some indication of the extent to which the future is receiving attention.

This research is evolving economies in production.... greater safety.... lower operating costs.... higher speeds.

**Boeing Airplane Co.**  
Seattle, Washington

*Mail by Air and Speed is There*

## Last Minute Briefs

Andy Cunn is building a plane of his own at Landsdown, N. Y.

The Fairchild monoplane flying boat with folding wings is expected to be finished by June 1.

A national aircraft show is planned by Sue Leandro, Calif., to be held sometime this September.

Prof. Hugo Junkers, designer and builder of aircraft bearing his name, has arrived in America.

Brewer Aircraft Co., San Francisco, Calif., is open in production and plans to complete two planes in May and increase production each succeeding month.

Franklin Jones and Sam Metzger, Oakland, Calif., pilots, have taken the agency for the Stearman planes. They will be substitutes for Walter Vaneoy of the Vaneoy Airlines.

The Mexican Government expects to be ready to establish air mail service between Mexico City and Nueva Lareda by June 1, it has been announced.

Charles Frohman, Carlton Field, Long Island, N. Y., has completed his first plane and plans to start production very shortly. It is an OX-5 open cockpit biplane with many original features.

Passenger fares between Chicago and Kansas City by air have been reduced from 14 to 18 cents per mile by the National Air Transport, Inc. The new rate is \$15 between these points.

Amusement parks have been made for two 200 x 100 ft. tracts at Wald-Chamberlain Field, Minneapolis, to house the First Annual Northwest Aircraft Show to be held May 24-25. The charge for exhibition space is 25 per square foot.

Miss Thelma Baerle, well-known German aviator, has also come to this country. She plans to fly back to Germany in the "Adelphi," a Stearman-Detroler monoplane she has purchased from George Wain, New York pilot.

Pacific Technological University of San Diego, Calif., has opened its Sanderson School on which practical instruction on the latest type of planes and engines is now being given. The institution is affiliated with the Ryan Flying School.

The Chesapeake Aircraft Corp. of Baltimore, Md., has been reorganized with capital increased to \$50,000. The company's field was recently opened. It lies adjacent to Langley Field in Dumbell.

Secretary of War William has appointed Rear Adm. William E. Shackley of the Bureau of Operations to head a board to investigate ways and means to develop more safety in Naval aviation.

Work on New York City's municipal airport on Barren Island is to start in a few hours, according to an announcement by Albert B. Hager, president of the Flatbush Chamber of Commerce.

The Junkers Company in Germany recently completed a low wing monoplane powered with a Bristol Jupiter engine for New Guinea Gold Co. for operations over the rough terrain in New Guinea.

What is believed to be the first commercial clothed wing plane in the United States was flown last week at Coney Field, Long Island, N. Y. It is a De Havilland Moth, Gipsy engine, imported by Air Associates, Inc. The plane was used in the promotion of Handley-Page, designer of the air.

The Wisconsin Flying Club was recently formed at Milwaukee, A. A. Weidman, Frank Durbin, and Frank J. Schuch being the incorporators. A Handley-Page biplane has been purchased by the organization, which will act as dealer for that plane in Southern Wisconsin.

The new Bristol "Tiger" engine, a five cylinder radial developing 230 hp., is undergoing tests in an Arrol tractor plane in England. This engine was developed primarily to compete with the Wright Whirlwind. A piston version of the same engine is now under construction.

Postmaster award of the world's record for the longest flight in a Class C single place airplane has been made to Harry J. Brooks, Ford pilot, last in the series of Alvin Brooks flew the small Ford plane 552 mi. from Detroit to Ft. Worth, Fla., last February.

Three 240 hp. Hispano-Suiza engines have been exhibited for the three 180 hp. power plants of the same make original by placed on Rene Comand's plane, described on the April 26 issue of AVIATION. Greater power was needed for the monoplane which the French pilot plans to use this summer in a trans-Atlantic attempt.

Lighters for the western half of the transcontinental and other western airways have been purchased by the Department of Commerce, the American Branch announced. The San Francisco-Salt Lake City section of the transcontinental line, the Los Angeles-Salt Lake, and the Louisville-Chicago will require 250 lighting beacons.

The Stearman Aircraft Co. of Detroit has completed the monoplane ordered by Ben R. J. Russell for a flight from Rockford, Ill., to Blackstone, Sweden, this summer. It will plan to fly by way of Greenland, Iceland, and the Feroe Islands, thus bringing the greatest over-water hop to just 28 mi. in length.

John Henry Moore and Charles Collier, pilot, will leave New York City on June 9 in attempt to circle the world in 23 days. He will use a Fairchild cubic monoplane to cover the route from France to Japan and across the American continent. The Atlantic and Pacific will be crossed by boat. You will get a globe grinding record of 35 days 21 hr. 35 min. in 1927 which he held until 1926.

Further repairs on the dirigible "Helen", in which Ground Submarine No. 1 is to explore the Arctic, are being made by the crew at Spitzbergen on Arctic gun to pass. Part of the aerodrome, here at Vadsø, Norway, is building, is being gone over, and one of the engines is being overhauled. The General plans to leave Spitzbergen for the Polar region in a few days.



## MORE AND MORE PILOTS INSIST ON SEESALL

More of long flying experience know that good vision is essential to safety. Since the perfection of Seesall, the goggles without a blind spot, there can be no excuse for faulty vision. Your vision is perfect in all directions.

Pilots are demanding Seesall not only for safety but also for the accurate hour comfort it affords. Wear this goggles two or three minutes and you forget you have ever The single ply periscope rubber mask hugs the face while

out discomforting pressure—and yet there is not the slightest air leak anywhere.

Although created by the foremost maker of non-shatterable glass, Seesall is made of plain, curved glass. If desired, you can wear Seesall over your own spectacles.

There are Seesall dealers most everywhere. But if you cannot find one, send us your check for \$15.00 and you will get your Seesall goggles by return mail in a handsome metal case. With light colored lenses, if desired, at the same price.

### Lamoglas

THE TWO MOST PERFECT NON-SHATTERABLE GOGGLES

WRITE FOR COMPLETE CATALOG

INVESTOR \$1.50 PER PAIR  
CONSUMER \$1.00 PER PAIR  
with New Shatterable Lens

BECK DISTRIBUTING CORP.

Local Selling Agents



79 EAST 131st ST., NEW YORK

Wholesale orders sent after New York office hours send to: E. M. de la Cruz, 2400 Broadway, San Francisco, Cal.  
ORDER FOR THE AVIATION



LAMOGLAS \$1.50 PER PAIR  
Goggles rubber lining



## Lieuts. Gavin and Soucek Fly Navy PN-12 Seaplane to New 36 Hr. Endurance Mark

BETTERED BY 7 hr. 25 min. 46 sec., the world's flight duration record for seaplanes was broken on May 6 when a new record of 36 hr. 1 min. 15 sec. was established by Lieut. Arthur Gavin and Lieut. Zeno Soucek flying a Navy PN-12 seaplane powered with two Wright Cyclone engines, each developing 125 hp. The old record, which was 29 hr. 35 min. 37 sec., was set by Lieut. C. H. Schiltknecht and J. B. Kyle in a PN-9 plane May 1-2, 1932.

Lieutenants Gavin and Soucek took off Thursday afternoon, May 3, at 2:56:28 from the Philadelphia Navy Yard. J. G. Prober, mechanic, and H. F. Dayton, Wright engine expert, accompanied the fliers, then keeping the record breaking over to four. At 7:55:54 P.M. Friday the old mark was passed, and at 2:54 A.M. Saturday the fliers landed at the Yard, fuel gone and new record set. The flight was under the supervision of H. H. Weyersbacher of the Navy Aircraft Division. Preparations for the flight were made early Thursday morning, but heavy weather delayed the take off until 5 A.M. A second take off was necessary, however, for after 26 min. of the first flight Gavin and Soucek were forced to land on account of oil trouble. Once in the air following repairs, the plane flew on again down the Delaware River at its average altitude of 500 ft. until late Friday night. At this time, the fliers went to a higher altitude to land later in a glide when their gasoline was gone.

Official recognition was given the record by Carl F. Roberts of the National Aeronautic Association, who arrived Friday evening to be on hand to verify the new mark. The aviation tunnel made for such record attempts stipulates that when a flight is more than 48 hr. in length the old mark must be surpassed by at least one hour. When the flight is from 24 to 48 hr., the flier must exceed the old mark by but one-half hour. Lieutenants Gavin and Soucek broke the record Tuesday last year when they made a total of 347 hr. without refueling. The record is given for endurance, and safety is flying. Lieutenants Soucek is aviation superintendent of the recreational section of the Philadelphia Navy Yard.

## Form Omaha-Winnipeg Airway Association To Promote Route Between Those Cities

OMAHA WINNIPEG Airway Association for promotion of an air route between the two mid-continental cities was formed recently in Omaha by representatives from commercial cities in Great Falls, N. D.; Watervliet, N. D.; Sioux Falls, S. D.; Sioux City, Ia.; and Omaha. More than 30 delegates, representing aviation associations and including city officials, attended a conference held at the Postoffice Hotel.

B. B. Lawrie, secretary of Sioux Falls Chamber of Commerce, was elected president of the association, and W. M. Skirley, secretary of Watervliet Chamber of Commerce, was elected secretary.

At the close of a three hour session, at which it was decided to hurry to Washington an application for a route between Omaha and Winnipeg, Great Falls, Nebraska promoter for the National Aeronautic Association, who left early for Washington, was instructed to address congressmen and federal postal authorities to urge establishment of the proposed route.

The projected route would include 600 mi. of territory between Omaha and Winnipeg, and would connect Great Falls, N. D.; Fargo, Watervliet, S. D.; Sioux Falls, Sioux City, Ia.; and Omaha with the Canadian city.

Mr. Lawrie and Mr. Skirley, elected heads of the new organization, during the two weeks before the conference made a review of the territory which would be served by the pro-

posed route, and at the meeting of aviation groups at special national interest and demand for the service, which would result from establishment of the route. The air-lashed cities, they reported, furnish excellent air facilities, a good emergency landing, and flying conditions over the route, they said, are constantly good.

Lack of railway facilities from Winnipeg to Omaha is noted as one incentive that the most of individuals, would become a profitable undertaking. Traffic from air transport companies, according to W. A. Kline, secretary of Omaha Chamber of Commerce, would possibly equal half the amount now paid to operators of most mail routes, on account of a increased profit from passenger service.

## Arrow Aircraft Corp. of Haverlock, Neb., Completes New Model Arrow Sport Plane

THE ARROW Aircraft Corp., Haverlock, Neb., recently announced the completion of its latest model, the Arrow Sport plane, a two place, open cockpit, full cantilever plane. The plane is a direct development from the old open design brought out by the company in 1926. The new plane is powered with either a 58 hp. LeRoi or Allison engine. The first to be completed was powered with a LeRoi engine and is claimed to have a top speed of 110 m.p.h. and a landing speed of 32 m.p.h. It weighs 325 lb. empty and has a useful load of 450 lb., bringing the total weight up to 775 lb. The cantilever two people sitting side by side in the open



Front quarter view of the Arrow Sport plane.

cockpit. The plane has exceptionally clean lines with no external bracing to support the tapered wings. However, X type struts between the wings are optional with the purchaser. The plane is stated to sell for \$2250 to the factory.

## Recently Organized Sabine Airways, Inc., Of Beaumont, Tex., Is Waco Plane Dealer

SABINE AIRWAYS, Inc., of Beaumont, Tex., a new organized air transportation company, has been described as Waco dealer for Southeast Texas by the University at Beeville, state dealer. Delivery of the first plane has been made and the second, which is expected to be a Ryan biplane, will probably be received within a short time.

The Sabine Airways, Inc., will maintain headquarters at Beaumont, Tex., but will have operations units at Orange and Port Arthur in addition, according to Lieut. William K. Brown, who has been named manager of the company. Brown was formerly connected with the National Guard Academy in Houston and is a graduate of Brooks and Kelly Fields.

The company will operate a larger recently built air terminal field by the George Car & Steel Company and will operate a school in connection with its air transportation work. A complete flying service will be maintained.

# Alexander — moves his Industries in twenty-four hours

On Friday, April 20, a fire destroyed the doping and wing covering building at the Alexander Industries, Denver. Eleven lives were lost and a number of men, through acts of heroism, received severe burns.

All doping and wing covering equipment, one hundred finished and partially finished wings, were consumed by the flames. The storage yard was filled with new Eaglecraft winging wings. One hundred and forty seven orders were yet to be filled. The Denver plant being badly crippled, and the huge new plant being constructed at Colorado Springs was only partially complete.

Certain public officials were keeping pressure in hand, which was intolerable. On Monday night, April 23, Alexander officials were informed that the entire plant must be closed until an inspection could be made. Such a procedure would have been ruinous. Thousands of advertising film contracts had to be filled on schedule or a three million dollar lawsuit business would result. Over three hundred employees faced unemployment.

D. M. Alexander, vice president of the Industries, commenced authoring his lay men at midnight. Madison Paul Reeves issued checks yet willing workers from their beds. Over telephone messages calls completed the job. By daylight brown and black were united and the tremendous task of moving a great industrial plant was under way.

Moving companies released all available men and the grounds of the Alexander Industries with the

wing men had taken on the semblance of a troop movement in war time.

Many officers were assigned through their previous mass office experience. Men and sales, Machinery, stage sets, cameras and the miscellaneous assortment of equipment which represented the bulk of one of the greatest industrial plants in the West. The great task had begun.

Colorado Springs was seventy five miles away. Buildings for housing the Industries had already been arranged, the Denver men and the Chamber of Commerce of that City had met the emergency.

An abandoned church, ideally fitted out for offices, was thrown open in three to receive the new plant. A stable became the film quarters. A warehouse was turned into a complete wood shop. A garage became a parking place.

IN 24 HOURS "BUSINESS AS USUAL" became the sign read by the people of Colorado Springs. The gigantic undertakings which seemed all but impossible had been crowned with success.

The company is now located in one of the most friendly cities in the world. It has demonstrated itself as such. This business is again in full swing. Eaglecraft deliveries will again be under way by the time this issue is in the hands of "Aviation" readers.

A crew of 145 workers are speedily completing the main Eaglecraft factory building which covers a ground area equal to a city block. Doping and wing covering now being done in specially arranged tents will soon be in new buildings. Eaglecraft production is increasing from a two weeks delay and will soon be on schedule.

Our friends and customers — we have endeavored to give you this story in an effort to the erroneous reports which were placed on the wires throughout the country, that we were out of business, severely crippled, plant shut down, etc. etc. We are carrying on and are immediately increasing production of the quality ship you know — EAGLECRAFT.



Division of the Alexander Industries, Inc., now located in Colorado Springs, Colorado

FRANK EUG for marketing ATLAS

## Schedule Tourist Air Cruise of Europe To Leave Bremerhaven This September

Called "THE first air cruise in history," a tourist journey known as the "American Aviation Tour of Europe 1928" will leave 2,700 on its way to Berlin through Germany, Austria, Switzerland, France, Holland, and England early this fall. The project is a cooperation of the North German Lloyd, the German Luft Hansa, the Imperial Airways, Ltd., the Air Union, the Falmouth Company, and the Kees Lockheed Fly of Amsterdam.

The third liner Columbus will leave for trans-Atlantic passage last night. This liner will leave New York September 8, cross the Atlantic, and dock at Bremerhaven, Germany. The air tour of Europe will follow. Several features of the trip will be announced at the International Aeronautical Ex-



Map showing the route of the American Aviation Tour of Europe

hibit to be held at that time in Berlin, inspection of the world famous airplane works of Gotha in France, Fokker in Holland, Fokker-Wulf, Junker, Bock Klemm, Langley, Bock, Daimler, Dornier and Zeppelin in Germany, and other points of airplane interest in England and in the continent.

For the sake of variety, and to enable the tourists to see certain features of the journey from the ground, the comparatively short distance from Bremen to Cologne will be made by rail. From Cologne to Cologne they will be in the further comfort of a trip on the Rhine. From Cologne to the Croydon Field, via Paris, Berlin and Amsterdam, the cruise will be continued by airplane. At Southampton the travelers will board the "Columbus" to arrive back in New York October 29. Cruise passengers will fly in a variety of planes, it is said, during the course of the journey—American, French, Dutch, and English—the giving them a chance to learn some of the characteristics of the various foreign aircraft.

Full information concerning the trip may be secured from the Executive Committee, American Aviation Tour of Europe 1928, 22 Broadway, New York City.

## Gates-Day Company Now Building Factory For Manufacture of New Standard Planes

DEFINITE ANNOUNCEMENT of the location of a new factory of The Gates-Day Aircraft Corp. in Patuxent, N. J., has been made. It is at 89-925 East 2nd St., Patuxent, N. J., not far from the plant of The Wright Aeronautical Corp. This decision was made public following announcement that

a group of Patuxent business men, headed by Nelson E. Kofke, president of the West Patuxent Bank, had interested themselves in the organization.

New Standard planes will be produced within approximately 60 days. Charles H. Day, who designed and produced the famous J-1 Standard, and that machinery, material, and equipment will be installed in the factory. Production will be set on a basis of 300 planes a year at the start, but it is stepped up to 500 a year within a short time, according to the officers.

The New Standard is a five place, open cockpit, monoplane. It will sell for \$2,500, approximately, with 150-hp. Hispano-Suiza engine, and corresponding higher price for new production water-cooled engine. Mr. Day and his engineers have spent more than a year on the construction and design, which now are completed. Mr. Day, formerly chief engineer of The Standard Aeronautical Corp. during the war, has designed 22 commercial types in his 22 years experience.

Officers of the corporation are Frank B. Golen, president, Charles H. Day, vice president, George H. Davis, secretary, and Nelson Kofke, treasurer.

Assembly will be at Teterboro Airport, Hackettstown Heights, N. J., the opening headquarters of The Gates Flying Club, which is a subsidiary of the manufacturing corporation. The operations company includes the flying school, on lot in the West and East, the flying school, and the various aerial passenger, photographic, and advertising services at Teterboro Airport. The repair shop at Lodi, N. J., will be continued.

## Richard F. Hoyt Named Head of the Board Of Directors of the Pan-American Airways

THE ELECTION of Richard F. Hoyt to chairmanship of the Board of Directors of the Pan-American Airways, has been announced. The company is operator of the first international air line for passengers and mail between New York and Havana.

Mr. Hoyt is extremely active in aeronautical circles. In addition to his relations with the Pan-American Airways, Mr. Hoyt is chairman of the Board of the Wright Aeronautical Corp., a member of the board of the Korryn Aircraft Corp., and an officer of the banking firm of Hooper Stone & Co. Mr. Hoyt has just returned from an extended tour of Central and South America during which he made a careful survey of air travel conditions in those sections.

On the board of directors with Mr. Hoyt is George Minter of Hooper Stone & Co., C. V. Whitney, director of the Guaranty Trust Co., Stone Colt, vice president of the Farmers Loan & Trust Co., John A. Hamilton of Hamilton & Company, R. B. DeVine, president of DeVine & Co., and J. T. Tappan, president of Pan-American Airways.

Mr. Tappan reports that since October 1927 the Pan-American Airways, Inc., has carried 770,000 lb. of mail and 700 passengers on a daily schedule which has been 100 per cent. efficient. Two full business days are saved in the transfer who use this air service.

## Waco Plane Dealership in Ocala-Gainesville District of Florida Taken by Joe Borden

JOE BORDEN, automobile dealer of Ocala, Fla., has been announced as Waco agent for the Ocala-Gainesville district of the state. He has received his demonstration plane from a school of five received in Orlando, Fla., by Niles-Morris Co., state distributor, and flew it back to Ocala with his pilot-manager, L. E. McLaughlin.

Three of the five planes of the latter company have been delivered and sales of the other two have been deferred.

## FIRST ANNUAL WESTCHESTER SEAPLANE RACE MEET JULY 11th & 12th, 1928

Sanctioned by the  
National Aeronautical  
Association

Under the auspices of Playland,  
Westchester County  
Park System

Sandy, well protected beach.

Ample police grounds. Every  
facility for the care of seaplanes  
and flying boats is offered free of  
charge to all contestants.

## PRIZES

Handsome organization trophies  
and pilots' prizes for military events.  
Cash and pilots' prizes for civilian  
contests.

## RESERVE THESE DATES

Free Entertainment

Q. B. Headquarters

Entries are now being received by the

Seaplane Race Committee

WESTCHESTER COUNTY PARK SYSTEM

Playland

Rye, N. Y.

## Form Metal Aircraft Co. of Cincinnati To Manufacture "Flamingo" Monoplanes

THE METAL Aircraft Co. of Cincinnati was recently incorporated at Columbus, O., and the purpose of the company has been set forth as "manufacturing, designing, building and handling all kinds of aircraft and parts and accessories thereof." Immediate plans of the company, however, are to manufacture all metal planes of the "Flamingo" type developed by Thomas E. Halpin and Ralph Graessner, Cincinnati, formerly of Detroit, the first of which was launched in Cincinnati Easter Sunday to be taken immediately to the All-American Aircraft Show in Detroit after being christened "Miss Cincinnati."

Incorporation of the company are T. Halpin, Engineer; E. Halpin, Ralph R. Graessner, John C. Hermann, H. C. Young, Jr., T. S. Goodman, E. Schaff, F. Lusk, Tyler Field and John B. Hollister. Those in the financing group are Henry Young, Jr., Robert Taft, E. Schaff, Lusk, Thomas S. Goodman, John S. Brown, John M. Peterson, Frederick H. Chaffin, William H. Brown, Chaffin, Fred Corbin, Jr., Tyler Field, John B. Hollister, James Conner, S. J. Dorrel, O. S. Greene, D. C. Jones, B. W. Lusk, E. H. Lusk, Leonard S. Smith, Jr., C. R. Wright and O. D. Vandenberg, Jr.

The group, which had been discussing possible financing of the project from the start of the manufacturing of the first plane, on the day following its flight in Detroit got together and pledged money then enough to finance the manufacture and distribution of the Eze II and said that offers also were received by Halpin and Graessner from financiers at New York, Chicago, Detroit, and St. Louis, to finance factories for production of the line in their respective cities, but the same motive prompted them to accept the Cincinnati offer.

Options on three airplanes Luskler Field, the principal support of Cincinnati, have been secured. Attorneys John C. Hermann, John B. Hollister, E. Schaff, F. Lusk, and T. S. Goodman will represent the company in all matters pertaining to its business.

The type of plane to be produced is an all-metal, single engine transport monoplane, within the same weight range and price range of standard wooden planes. It will hold six passengers in addition to the pilot, fuel and reserve fuel tanks. It will also have a lavatory. Freeboard is made for loading the doors, and it will have all other apparatus. The plane will weigh 2,000 lb. and will carry 3,000 lb., including its own weight. Capacity speed will be 150 m.p.h., cruising speed 125 m.p.h.

The plane will hold 150 gal. of gasoline and is expected to fly 3000 mi. on the amount with full load. There will be broken on each of the two wheels of the landing gear. The Flamingo will be the latest one, single engine air transport made to date, with a 48 ft. wing span and length of 32 ft. It will be able to rise after a run of 350 ft., undelayed, at 250 ft. loaded.

THE FLAMINGO was described in detail in the April 30 number of AVIATION.

## Geared Bristol Jupiter VIII Engine Passes The Official British 100 Hr. Approval Test

THE GEARED Bristol Jupiter engine has passed its 100 hr. official bench test of the British Air Ministry. The test was made on the new VIII engine which was officially rated at 440 hp. at 2,500 r.p.m. The engine maintained its power throughout the test, but the throttle had to be worked developed at the end of the 100 hr. run within one per cent of that developed at the start of the run. In order to cover the

series IX and XI engines, which differ only in connecting rods, a supplementary test of one hour at 440 hp. at 2,200 r.p.m. was carried out on the XI engine engine.

The manufacturer has submitted the following report on the test:

Preliminary Power Curve 100 hp. at — carried out at full throttle from 1,800 to 2,800 engine r.p.m.

Endurance Test 100 hp. at — carried out at 2,500 engine r.p.m. and at the 90 per cent approved ground rating, in 1 and 15 hr. run-stop runs. The final hour engine r.p.m. at full rated power.

High Speed Test 12 hr. — carried out at 2,810 engine r.p.m.



Powerful new reduction gear used on Bristol Jupiter Series VIII, IX and XI engines

at 3 per cent in excess of the maximum permissible r.p.m.

Low Speed and Acceleration 30 min. — sustained running at 140 engine r.p.m. and continuously up to normal r.p.m.

High Power Test 1 hr. — carried out at maximum permissible r.p.m. and at 8 per cent in excess of rated power.

Final Power Curve 100 hp. at — carried out at full throttle from 1,800 to 2,800 engine r.p.m.

Fuel and Oil Consumption — the average consumption for the 100 hr. endurance test at 80 per cent power was:

Fuel 27½ gal. per hr.  
Oil 10.14 pt. per hr.

## W. W. Dunlap Paper Tells of Successful Spot Welding Using the Aluminum Alloys

AT A recent meeting of the Detroit, Mich., section of the American Welding Society W. W. Dunlap presented a paper dealing with the results of an investigation of the spot welding of aluminum alloys by the Aluminum Co. of America at New Kensington, Pa. According to the results obtained, aluminum alloys can be spot welded successfully giving approximately the same strength as a steel joint. The secret of the process lies in the fact that the electrodes were of copper, chromium plated. It was necessary to plate the copper with chromium as chromium does not readily alloy with aluminum while unprotected copper electrode formed a layer of copper aluminum alloy which produced a bad weld because increasing the danger of burning a hole in the sheet by arcing. The tests were made with all type of aluminum alloys and it was found that when two flat sheets—1/8 in. by 1 in., were spot welded together at two points, the first had an efficiency of 83 per cent. When these points were used the efficiency of the joint was 84 per cent, while when the strips were welded at four points the weld was stronger than the strips.

## First Steps Taken in Cincinnati Toward City Department Control of Aeronautics

THE AERONAUTICAL development in Cincinnati has reached the point where a decision must be made concerning the proper departments and officials to control aviation, that place must be set aside for the building of the city's first air port, of course, and that an aeronautical bureau to supply reliable information to pilots and passengers must be established in the commission of C. O. Sherrill, city manager, who has just taken the initial steps in these matters.

Following a conference between Sherrill and the City Council, it was decided to vest control of the municipal airport, Linden Field, in the Department of Public Utilities, giving that department a measure of control over passenger operations using the municipal port, and full control over such non-municipal ports as may be established.

### Favor Partial City Control

The director of public utilities already has been given jurisdiction over gas, electricity, heating, and other utilities; and a private company using airports will have to have addition of routes, arrivals and departures, rules of fare, and other matters in which the public is interested, it is felt that the city should have a voice in these matters. A group of men and engineers by Sherrill's legal experts has provided a blueprint in the way of setting such authority in the Department of Public Utilities.

Sherrill further has expressed himself as favoring appointment of a director of airports, who should act as a pilot and a man with practical experience as well as scientific knowledge of air navigation and airports. Such a man, he feels, could most intelligently serve pilots and public, and is a likely that the entire country will be increased for the best equipped.

Apparatus and equipment of the passenger station, when completed, will be comparable to those of a modern railroad station, though on a smaller scale, compatible with the aviation needs of the times. An exact date for undertaking the work has not yet been set.

The aeronautical information bureau is to be established in the City Hall on a more convenient floor—possibly in a bank on Government Square—and will furnish complete daily information to all interested persons concerning weather, routes, and fields of the United States.

## Gordon Bennett Balloon Race Preliminaries Will be Held at Pittsburgh Memorial Day

ARRANGEMENTS have now been completed by Walter Chandler, executive editor of the Sun-Pittsburgh and grandmaster, to hold the 1938 National Aeronautics Balloon Race at Belle Field, Pittsburgh, on Decoration Day. The Air Club of Pittsburgh is to assist in the entertainment of all the visiting pilots and other aeronautical guests that are expected to be present.

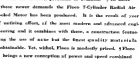
The National Aeronautics Association has announced that the winners of the first three places in the Pittsburgh elimination will be entered in the Gordon Bennett International Balloon Race which will start from Detroit June 30. Twelve teams have already been entered in the race.

The committee is composed of the following men: Samuel O. Whitten, general manager of the Dispatch News Company (Co. chairman); W. A. Lewis, vice president American Boat and Tug Photo Co., vice chairman; Henry C. Reed, president of the Belle Field Club, and director in the First Place; Jack McKeown, treasurer; and Walter Chandler, manager.

# FLOCO

THE new era in aviation motor construction methods is here! 3 New standards for motor performance and design have arisen within the industry to successfully cope with the modern problems of aviation. 4 To meet these newer demands the Floco T-Cylinder Radial Air-Cooled Motor has been produced. It is the result of years of testing effort, of the most modern and advanced engineering and it combines with these, a construction featuring the use of some of the finest quality materials obtainable. Yet, what, Floco is modestly proud, 5 Floco brings a new conception of power and speed combined to the end that the greatest dependability is obtained.

It occupies, at once, its rightful place as the outstanding aviation motor of the new age. It meets, in every respect, the demands of the commercial plane manufacturer for a motor of modern refinement at a low cost.



Floco T-Cylinder Radial Air-Cooled Motor. 150 H.P. Standard at 1800 R.P.M.



Floco T-Cylinder Radial Air-Cooled Motor. 150 H.P. Standard at 1800 R.P.M.

Complete literature on request

FRANK L. OENBREIT, Inc.  
132 West Sacramento Street  
Los Angeles, California

## Official Recognition Given German Altitude And Payload Records Made Last January

ADVANCES THAT the following World Records have been officially recognized were recently received by the National Aeronautics Association from the Federation Aeronautique Internationale:

Class C-2, Seaplanes with 3,500 lb. (1,600 kg.) payload.

Altitude (Germany):  
Richard Wagner, Dornier-Dojager, Four Gamma-Rhone-Jupiter 480 hp. engines, at Friedrichshafen, Germany, Jan. 23, 1928. Record—9,554 ft. Former record—none.

Class C-3, Seaplanes. Greatest payload carried to an altitude of 8,573 ft. (2,600 meters).

Germany:  
Richard Wagner, Dornier-Dojager, Four Gamma-Rhone-Jupiter 480 hp. engines, at Friedrichshafen, Germany, Jan. 23, 1928. Record—8,500 lb. Former record—Eugene B. J. Cassell and H. C. Noble—7,726 lb.

Form Acme Airways, Inc., of Troy, N. Y., for Distribution of New Pacer Monoplane

NEWLY FORMED for the purpose of distributing the new Pacer monoplane, the Acme Airways, Inc., of Troy, N. Y., will make its headquarters at the new Troy Airport, soon nearing completion. The Pacer, a semi-converter monoplane designed to run either the Elmo or Whirlwind power plants, is manufactured by the Pacer Aircraft Corp. of Perth Amboy, N. J.

The Acme company's territory for the plane is Northern New York and Western Pennsylvania. An order has been

placed for eight, and the delivery of the first of these is expected shortly. Using the Troy Airport as a base, the company will also engage in such commercial activities in photography and aerial advertising. The Acme group, Inc., was formed from the old Troy Flying Service group.

## The Lockheed Air Express

Continued from page 1377

Propeller: 100-hp. engine, 100-hp. engine, Standard Gas Engine, 100-hp. engine, 100-hp. engine, 100-hp. engine.

Magneto compass, barometer, air pressure gauge, oil thermometer, air speed indicator, altimeter, bank and turn indicator, night day clock.

Performance: (With pilot, 160 lb. pay load, 160 gal. oil, 80 gal. of oil)

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

100 mph, 10,000 ft. 100 mph, 10,000 ft. 100 mph, 10,000 ft.

## Aeronautics in Sweden

Continued from page 1369

Consistently the policy of safety has been maintained in Sweden. When the first Swedish kilometers had been flown, V.B. 1 (monoplane) was able to give out the necessary and useful 1,000,000 kilometers—24,000 passengers—300 per cent safety. Steadily through the years the number of kilometers and passengers had increased, but the 100 per cent safety had remained a constant factor. Such trend must be seen assuring that many another vehicle of modern construction can share.

In addition to this "Safety First" program, Sweden has aimed on active propaganda to bring home the idea that the service can become the everyday way. Last year a heavily



Local view of the Rullinge Airfield in the south of Sweden.

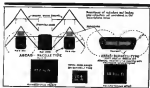
load-Swedish Tour was undertaken. Its aim was to make the public familiar with the 100 per cent Safety First airplane and with the actual pleasure of flying. The tour began in April and ended early in October—a period of five and one-half months. The tour took to Sweden, but well within the same circle and the southern tip does not extend as far south as the Atlantic Bay in Canada.

During the tour 100 Swedish towns were visited and the tour extended from charming medieval Tynd on the arm of the Baltic to Krasna within sight of the rugged snow-capped peaks of Arctic Sweden. Some fine dramatic photographs were taken from the air. There were 2,128 take-offs, and 8,418 persons found the opportunity for a flight, long or short. The actual distance covered was not great—a little less than the distance around the globe at the equator. There was no attempt at making or breaking records—merely an endeavor to make the six million Swedish people learn to think of the airway as the everyday way. One out of approximately every seven hundred of the total population flew the first flying tour was 237.7 km.

While the Rullinge-Swedish tour was in progress, Colonel Lindbergh was making his flight through our forty-eight miles on wheels time. The Spirit of St. Louis arrived 22:30 on July 23 and ended on October 25, with a total of 268 flying hours.

A comparative study of these figures only stresses the seriousness with which Sweden has launched its aeronautics propaganda. It should be borne in mind that Sweden has an area that is only a little larger than the total area of California and a population that is about the same as the population of New York City. One may safely predict that the history of the Rullinge-Swedish tour will tell in the

# DESIGN



**I**NVENTION of original airplane design has been rare and especially so when proved by thorough engineering construction and operation.

The Burnelli design combines the advantages of the single engine tractor with those of the nacelle type airplane with greater efficiency and accommodation.

Some Advantages of the

## BURNELLI TYPE

- Adaptable multiple engine compartment
- Extensive reduction of load resistance
- Reduced turning moment on one engine
- Fuselage lift reduces landing speed
- Increased capacity of the fuselage
- Structural efficiency and simplicity
- Practical Landing Gear Retraction



247 PARK AVENUE, NEW YORK CITY

## Patented Features

# Meyrowitz Luxor Goggles

In addition to all the other fine qualities that make Meyrowitz Luxor Goggles the standard of aviation, there are two patented features of supreme importance.

Asymmetrical sponge rubber cushions provide perfectly snug, comfortable fit in the face without eye straps. Can be adjusted to fit your face.

Foamliners in metal frames function under all conditions. Never close up with pressure. Prevent all fogging or sweating and direct air currents away from your eyes.

All models available in hand ground cylindrical or spherical lenses of special prescription lenses at slightly higher prices.



MEYROWITZ LUXOR GOGGLE  
U.S. Air Service Model No. 1  
In conventional protective aluminum case. \$10.75  
LUXOR GOGGLES No. 5, \$7.50  
LUXOR REGULAR No. 6, \$9.35



**E. B. Meyrowitz**

Dept. B, 520 Fifth Avenue, New York

Send for 1928  
Catalog and prices

Minneapolis St. Paul Detroit London Paris



lakes and fjords of regular passenger flying when the sea was for 1928 driven to a close.

The hydroplane used for this tour was a Junkers, type F13, provided with a Junkers L11 engine. It is so oriented as to permit the hydroplane to land on the water, and the large tanks are mounted around the water-front of lake or river or inlet of sea. In fact, only the towers in all were paved by means of inadequate landing facilities.



Transferring an injured man from a Swedish air ambulance to a ground ambulance.

for a hydroplane. In addition, four other towns were visited from the islands—Karlskrona, Vaxholm, Haparanda and Boden—since they lie in areas prohibited to aviation flying.

At Boden, one of these four towns, a concentrated another type of air service. This is the station for the air ambulance work of the Swedish Red Cross. Some years ago Private

Cool, brother of King Gustav V and one of the many members of the Swedish Royal family that are actively engaged in the work of the world, held the foundation for this service of providing the ambulance planes for relief work in time of peace in the wilderness of the north. The ambulances (on



One of Sweden's Red Cross planes equipped to land on the water.

carrying the work to the military hospital in Boden, has more than ever saved the life of someone living in the outposts of civilization. Similar services have also been extended by ambulance planes operating from Osterund, to the north, and for those who live on the most remote islands of the Stockholm archipelago.

Recently a public-spirited citizen of Sweden made a donation of 50,000 kronor to further the Red Cross work in the far north. Other gifts have also been received. Plans have been placed for the construction of a new ambulance plane, modern in every detail, to supplement the present army plane with which all the pioneer work around Boden was accom-

plished. The latter will be retained, however, for a much-needed supplementary service.

The pilot encounters many special problems in the northern regions. For winter flights the plane is equipped with skis. Daylight in northern lands may last no more than four hours. When a call comes in to Boden, or Osterund, it may require a flight of from four to five hours or more over dark snow-fields.

In the summer quite different problems arise. A plane provided with facilities for landing either on water or on land would solve many difficulties. The usual landing is on the wide expanses of one of the Norrland rivers. However, at times they are filled with huge rafts of timber floating down to the lake factory at sea with, for Norrland is the great forest region of Sweden. Further north, where the mid-night sun shows a continuous day and night for weeks, the pilot



Placing an injured man aboard a Swedish Red Cross ambulance.

must occasionally perform fly day north, only to be blinded by the blinding brightness of the ice hovering far hours past down the horizon's edge.

Often this Red Cross work, sustained principally for outposts of civilization, makes an appeal to someone who has retired all other propensities and dismissed the regular passenger flying in preference to at least an emergency landing. In fact, the ambulance plane has even conquered the land itself of the normal Lapps following his reindeer over the snowy tundra. At first the Lapps ran to terror from the "flying witch." Now, since they have been brought by plane to the hospital in Boden, they plead to be permitted to return by the air way when they are well again.

Slowly, through a safe and sure passenger service and through this Red Cross work, Sweden has been showing the world of good will for the sky. The country has an unusually extensive system of waterways, and its railway system is more comprehensive in proportion to population, than that of any other European country. Despite all this, and such as supplements other means of transportation. Even before the first season was ended, it was clear that the project had passed from the experimental stage to a permanent basis directed toward a slow but consistent development.

## The Langley Field Maneuvers

Continued from page 1385

The officers, with their own of four men and their machine gun, and all, are concentrated in extremely heavy fire on the attacking plane. The theory is, that so long as the machine gun concentrates the early superior weight of fire, the air is comparatively safe. The pursuit planes attacked several times, but always they checked above the hostess to



For The Discriminating Purchaser:

## THE AIRSEDAN

AIRLINE OPERATORS will find this plane meets with all their requirements. The cabin has exceptionally comfortable seats for four large passengers and the pilot's visibility is unexcelled.

PRIVATE OWNERS will approve of the fine appointments which are selected to satisfy the most critical taste.

CORPORATIONS desiring to keep step with the progress of the times will find that here is an efficient and up-to-date vehicle for transporting executives and personnel to widely separated branches.

We will be glad to assist you in determining the adaptability of this fine product to your requirements.

BUHL AIRCRAFT COMPANY  
Marysville Michigan

## The STEARMAN-Whirlwind



STEARMAN AIRCRAFT are not built with the intent of competing in that

already large field of manufacturers where sales are dependent on the low selling price of a product

STEARMAN AIRCRAFT HAVE A PERSONALITY

The Stearman Aircraft Co., Wichita, Kansas





words, the Vee engine was cut into three motions, time for time of four cylinders Vee engines being placed in each time 120 deg. apart, resulting in a two row radial 12 cylinder engine, one row directly behind the other. By 180 deg. off the rear end of the exhaust Vee in each of the three Vee engine cooling was obtained.

The feature of the low weight per horse power of the engine was partially maintained, as there is no expensive fuel pump or fuel valve in the lightest form of engine at a given rpm, and displacement that is heavier today. Also, by increasing the engine crankshaft speed the difference in effect. Second, the head resistance was kept very low, the engine outside diameter being 45 in., and the cooling diameter 30 in., which results in high propeller efficiency as is noted in the literature of the propeller to the diameter of the engine because larger than on the big radial engines, being the propeller type in clean aerodynamic air in a symmetrical form around the engine. In fact, the propeller has less force when operating in front of a symmetrical body than it would behind a form of engine such as the inverted Vee. By tending if the propeller runs very close to the engine, it would behind a small diameter and a short engine very high velocity was obtained. With six cylinders in a radial we have three large apertures, 50 deg. between each cylinder but which permit visibility as obtained on a 30 in. diameter on the 45 in. diameter propeller only at the overhead valve ports which extend for only a very short part of the circumference and are streamlined only.

With only six cylinders on a crankshaft the weight of connecting parts was greatly reduced permitting lighter fuel shaft speeds. Grounded valve gear combined in design to be 180 deg. apart was used which again permitted the high crankshaft speeds. The exhaust arrangement is exactly the same as on any Vee engine with the addition of six rows of exhaust ports at the bottom of the engine which can be manifolded with a muffler at a single row at the two or by cylinder in a bank has a large pilot on the top and which fits into a cutting bridge for two cylinders. This making it held in place with studs and nuts and carries the double crankshaft. The two crankshafts on each bank of two cylinders are driven by spur gears at the propeller end, one of these spur gears being mounted on a roller shaft below the two crankshafts. The latter shaft is driven through bevels and a master gear on the front end of the crankshaft, all of the vertical shafts being driven from this master gear. Each pair of crankshafts has a vertical shaft coupling for same adjustment.

The crankshaft, which is a two throw, 180° crank, is mounted on two Nanna-Hoffmann roller bearings one at each end. The center main shaft backed helical feed bearing is mounted at the large split main bearing support which is large enough to clear both crankshafts enabling the shaft to be dropped into the mainshaft which is of the helical type. The mainshaft is split at right angles to the crankshaft between the two rows of six cylinders being bolted together on a central flange on the inside of the mainshaft below the cylinders are put in place. This gives a very clean exterior to the machine and the vertical flange forms a support for the main main bearings.

The two pieces on the engine mechanism only the cluster of four main for driving the crankshaft, and the oil pressure flange. The streamer is located at the end of the engine for the purpose of accumulating and permits the use of a 40 and for drawing oil into the crankshaft for lubrication purposes. A large deep groove ball bearing for both radial and thrust purposes is used at the forward end of the nose of the engine on the crankshaft.

The connecting rods are of the split type, very carefully

as shown. The balance of the articulated rods on the Hoxton type is perfect, as each row of the cylinders equally balanced on the other row of cylinders on the engine crank shaft and it was only necessary to put enough balance weights on the crankshaft to take care of the unbalanced couple existing.

The above outline describes roughly the arrangement of the engine, however, a few details making this mechanism possible are given below:

The cylinder construction is of the conventional type with the exception that a four valve dual head cylinder is used similar to the water cooled Conquest engine. Bronze cast, are inserted in the aluminum cylinder head and the steel cylinder is secured in the aluminum head in the usual manner.



One up of a Conquest "Palmer" showing the installation of the Conquest "Palmer" engine.

Each cylinder in a bank has a large pilot on the top and which fits into a cutting bridge for two cylinders. This making it held in place with studs and nuts and carries the double crankshaft. The two crankshafts on each bank of two cylinders are driven by spur gears at the propeller end, one of these spur gears being mounted on a roller shaft below the two crankshafts. The latter shaft is driven through bevels and a master gear on the front end of the crankshaft, all of the vertical shafts being driven from this master gear. Each pair of crankshafts has a vertical shaft coupling for same adjustment.

The crankshaft, which is a two throw, 180° crank, is mounted on two Nanna-Hoffmann roller bearings one at each end. The center main shaft backed helical feed bearing is mounted at the large split main bearing support which is large enough to clear both crankshafts enabling the shaft to be dropped into the mainshaft which is of the helical type. The mainshaft is split at right angles to the crankshaft between the two rows of six cylinders being bolted together on a central flange on the inside of the mainshaft below the cylinders are put in place. This gives a very clean exterior to the machine and the vertical flange forms a support for the main main bearings.

The two pieces on the engine mechanism only the cluster of four main for driving the crankshaft, and the oil pressure flange. The streamer is located at the end of the engine for the purpose of accumulating and permits the use of a 40 and for drawing oil into the crankshaft for lubrication purposes. A large deep groove ball bearing for both radial and thrust purposes is used at the forward end of the nose of the engine on the crankshaft.

The connecting rods are of the split type, very carefully

## "Oh Boy! What Performance!"

**T**HIS Enthusiastic Comment in a recent letter from the West Indies Aerial Express, refers to the Keystone Pathfinder 3-Engine Transport De Luxe 10-Passenger Air Liner (shown above) which links The Historic Islands of the Tropical Atlantic.

"203 Hours without any major repairs" — "Never Missed a Trip" — Such Superlative Performance by a Large ship can only result from Careful Design, Superior Workmanship and the use of High Grade Materials.

Yet it typifies the service obtained by all users of Keystone planes.

The latest Pathfinder model — built around the Air cooled "Panther" engine — is now under construction, and promises to become the sensation of the 12,000 pound class. It, too, is propelled by 3 radial Aircooled Engines.

Full particulars cheerfully furnished interested syndicates on request

## Keystone Aircraft Corporation

BRISTOL, PENNSYLVANIA

Truscon Hangar for the Falmouth Airplane Manufacturing Corp., Falmouth, L. I.

# AIRPLANE HANGARS

Truscon Airplane Hangars are permanent and fireproof. They are constructed from standardized units which can be combined into buildings of any desired length and width. Being laid out in clear spans, their unobstructed floor space assures utmost freedom in handling ships.

## Large Sliding Doors

opening the full width of the building, simplify the starting of planes. We furnish Steel Doors for every requirement.

**TRUSCON STEEL COMPANY**  
WASHINGTON, D. C.  
MEMPHIS, TENN.  
Main office and plant, 1000 Broadway  
WASHINGTON, D. C. OFFICES IN INDUSTRIAL CENTERS

# TRUSCON BUILDINGS

for all special requirements and for every need of the Airplane Industry.

Send information and quotations on request

Truscon Steel Company  
Washington, D. C.

Please quote price on Hangar as follows: ☐ Single ☐ Double ☐ Sliding

☐ Plans and Descriptive Folder

Name \_\_\_\_\_

Address \_\_\_\_\_



liminary tests of the PN-12, the latter can be operated in air at a much higher gross load than the above, which will increase the useful load accordingly. Based only on this table, however, the useful load has been increased 86 per cent over that of the P-3's, and is now 45 per cent of the gross weight. This increase has been effected by a combination of higher weight, due to metal construction and an added engine, increased aerodynamic efficiency, and increased engine power. At the same time there has been a considerable decrease in the fuel requirement due to the weight saving, due to additional aerodynamic, electrical and other equipment.

The percentage crew of this plane consists of four men as follows: Pilot, navigator/loader, radio operator, and mechanic/gunner. In wartime, however, the crew would be increased to at least five, in order to properly handle the armament provided which is as follows: Shock vents capable of carrying 1,000 lb. of bombs of various sizes up to two 500 lb. bombs, and gun mounts for six Lewis machine guns, two in the forward cockpit, two aft and two in the side aft.

This plane is designed so that it can readily be fitted with extra fuel capacity in case it is desired to use it as a long distance scout plane, in which case most of the armament weight would have to be removed. During the preliminary trials, it has shown that the plane can readily take off with 17,000 lb. gross load. Experiments with the PN-12 and consideration of load factors show that this can be done with safety. This would allow an extra load of about 450 gal. of gasoline or 1250 gal. in oil, with which the endurance as a long distance scout should be about 17 hr. and the maximum 2,000 m.p.h. at cruising speeds. Trials are now being conducted to obtain accurate data as to this performance.

**Editor's note:** Since the writing of this article, the PN-12 has established a new world's endurance record for airplanes.

Information concerning this record flight is contained in a new article printed in the same column of this issue.

## Chassis Analysis

Continued from page 1269

36 x 6	16,000	56	7.25	1.07
44 x 18	25,000	132	10.0	1.36
54 x 22	26,000	175	15.0	4.00

### Shock Absorber Systems.

The simplest method of taking shock loads is by the absorption of elastic shock. Up to a few years ago this was about the only method employed, and it is still widely used. A load-absorption diagram for shock absorber shock is given in Fig. 67.

Many companies are now making also and also promote shock absorbers for airplanes use. These are better than elastic shock systems but they are much better as far as shock absorbing and maintenance qualities go. The first law the load factor may be decreased 25 per cent with as the gear indicates that they absorb the shock more effectively. The use of a lower load factor will also save some weight in the struts and possibly the wheels and their components for the extra weight of the absorbing system.

### Chassis Analysis of

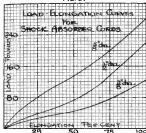
Continued from "Continued Shock Absorber Shocking."

The gross weight of the plane, the chassis weight, and the position of the center of gravity of the plane are used in the chassis analysis. The first thing to do then is to list the

May 15, 1929

weight and figure the center of gravity of the airplane. A complete installation diagram of the plane should be made, the center of gravity of each item placed as nearly as possible, and the location of each point measured off and listed as in the following table. The propeller axis is horizontal and all measurements are made parallel or perpendicular to it.

FIG. 67



Balance Table

Horizontal Arms measured from front face of rear propeller shaft.

Vertical Arms measured from thrust line (propeller axis).

Item	Weight	Vertical Arm	Vertical Moment	Horizontal Arm	Horizontal Moment
Propeller	65	0	0	-3	-195
Engine	260	0	0	8	2080
Oil & Tank	45-116	-150	22	1440	
Power Plant					
Cylinder	56	16	903	42	2352
Piston	105	0	0	66	16,500
Crank	130-30	-8000	60	7800	
Oil & Tank	330-35	10,000	80	26,400	
Wings	305	32	11,560	68	20,736
Propeller	220-3	-500	56	31,120	
Fuel Tank	120	-7	-840	50	33,000
Engine	100-21	-2180	502	16,200	
Tail	10-15	-150	598	2880	
Tail Section	50-12	000	517	16,800	
Totals	2010	+13,000	32,518	365,430	

Vertical position of C.G. =  $\frac{32,518}{365,430} = .088$  in. above thrust line.

Horizontal position of C.G. =  $\frac{365,430}{2200} = 23.95$  in. back of prop. shaft.

Location of Wheel Axis:

Vertical Position = .45 in. below thrust line.

Horizontal Position = 99 in. behind prop. shaft.

Distance between C.G. and Axle:

Vertical =  $0.88 - .45 = 0.43$  inches

Horizontal =  $73.95 - 99 = 25.05$  inches

Description of Chassis.

The chassis used on this plane is one which has been used extensively on commercial planes during the past two years. It is by no means the best available type but it is simple to construct and analyze. The axle and the rear strut are

# FLY With The AIRMasters



THESE far-flying, powerful and flexible cabin monoplanes, The Airmaster Coupe and The Youngstown Youngster, "The Little Airmaster", stand out as personal flying craft.

Luxury and elegance are combined in them with mechanical sturdiness and absolute dependability.

Dealerships open in several Territories. Write—or wire

**AIRMASTER COUPE**      **YOUNGSTOWN COUPE**

36 feet open      30 feet open  
50 hp. Left Hand Engine      60 hp. Left Hand Engine  
\$1,000 Down      \$1,275 Down

(Prices subject to change)

**OHIO AERO MANUFACTURING CORPORATION**  
Youngstown, Ohio





## Lindy's New Ryan Monoplane is Equipped with Belden Wire

**M**ATERIALS were selected with the utmost care by the R. F. Mahoney Aircraft Corporation for the new airplane recently built for the nation's air hero, Colonel Charles A. Lindbergh. It is significant that Belden Wire is used throughout for navigation lights, landing lights, electric starter, and all other low-tension wiring on the plane, to which the eyes of the nation are turned.

Belden Manufacturing Co. 5700 N. W. Michigan Ave., Chicago, Illinois

*Specify*  
**Belden**

Specify Belden Aircraft Wire for all aircraft wiring. Belden Wire is the standard for all aircraft wiring.

## CURTISS-REED PROPELLERS

Manufactured Air Transport, operating the Air Mail and Express lines from New York to Chicago and Chicago to Dallas, uses us.

"Of the 12 Curtiss-Reed propellers which we now have, one has over 1,000 hours' service, six over 500 hours, one over 400 hours, and over 700 hours, and the remainder between 300 and 700 hours."

"We feel that all of them are good for 1,000 hours before any doubt exists as to their ability to develop which we do not anticipate now."

### Two Types now available

Type A—A flat, tapering of high efficiency and strength. Particularly desirable for motors of 200 H. P. or more.

Type B—A flat, tapered type, for lower-powered motors. The most inexpensive metal propeller on the market today, despite its efficiency and long life.

Write for Price

The Curtiss Aeroplane & Motor Co., Inc.

Office: Garden City, N. Y.

Factory: Garden City & Buffalo, N. Y.



Subs: in (2) for AD. —364.8 + 0 + .561 — 634 = 1.351 X .561 = .761/268 = .00281 (Comp.)

Stresses in Struts for Unit Loads.

Member	Stress for Unit V	Stress for Unit D	Stress for Unit E
Front Strut AB	+354	+1.61	+90
Rear Strut AC	-133	-0.58	-32
Rear Strut AD	+123	-1.17	-63

+ indicates tension — indicates compression.  
The rear struts are inclined plane or means because the side force may act in or out. Our equations were based on side force acting in. If we had assumed a side force out, the type of stress in the struts would have been reversed but of the same amount.

### Bending in Axle

The front strut AB is usually termed the axle of the wheel. It is a continuous member from the point where it is pinned at the footstep right up through the hub of the wheel. The shock absorber, strut AC and the rear strut AD are placed where they join the axle and at the footstep. They are therefore unable to take bending and the axle must take it all. When the axle is rotated forward as it is in our plane it is subject to tension as well as bending stresses but this is usually neglected, or neglected.

There is a bending moment imposed on the axle due to the fact that the loads on the wheel act at the center of the hub which in our plane is 4 inches out from the strut pin. The vertical and drag forces are applied at this point. The side force is 12 inches below the axle and it also pins the axle to the wheel. When the vertical force is acting up, or if other force, and the side force is acting out, which condition we



Fig. 69.

be investigated, the moments due to the two forces are added together. The bending will be computed later as the angle of the various conditions. It is to be remembered that the moment arm is 4 inches for the drag and vertical load, and 12 inches for the side load.

In analyzing the stresses for a unit load we placed the load right at the strut pin. What we were really doing, as shown in Fig. 69 for a vertical load. The actual load  $V$  acting at the center of the hub was replaced by a couple equal to  $V$  and a force  $V$  at the strut pin. Now, however, the couple  $V$  suggests a reaction in all the members to which it is applied. The amount of this reaction is  $V/a/b$ . There, the vertical force, we must have a reaction of this unit amount,  $V/a/b$ , acting at the strut pin. In reality, the force  $V/a/b$  at the footstep and at the strut pin are a couple which just equal the couple  $V$ . This is easily shown by multiplying the reactions by the distance between them.  $V/a/b$  is then repeated from the figure that we actually have a vertical force  $V$  —  $V/a/b$  acting at the strut pin. It is everywhere we called that a force of 3 pounds and solved. We

and now increase the stresses obtained in the struts by multiplying them by  $V$  —  $V/a/b$  in which  $V$  is the vertical component in the design load for whatever conditions we are computing. A similar multiplication must be made for the other two loads to the drag, namely,  $D$  +  $D/a/b$ . It is evident from Fig. 69 that for our plane  $a = 4$  and  $b = 28$ . Thus we obtain the true design loads at the strut pin we must apply the  $V$  and  $D$  components of our load by  $(1 + a/b)$  which is  $(1 + 4/28) = 1.143$  and  $1.143$ . In the case of the side load, we have just estimated above for the moment arm of the force is 12 inches. This is equivalent to the quantity  $a$ . For the side force,  $b$  is measured vertically from the hub of the wheel to the bottom of the hub where our side strut joins. Referring to Fig. 69 the distance is found to be 35 inches, or approximately  $b = 35$ . It is then  $(1 + a/b)$  is then  $(1 + 12/35) = 1.343$ . That is, the design side load to be applied at the strut pin is 1.343.

### Level Landing Condition

Wing Weight of Plane without fuel, oil, etc. 2219 lb.  
Weight of Chassis 1100 lb.  
Total weight on chassis 3319 lb.  
Total weight on wheels 3319 lb.  
Total weight on wheels 3319 lb.  
Total weight on wheels 3319 lb.

In the Level Landing condition the resultant force is assumed to be along a line through the axle and the center of gravity of the airplane. This line is labeled  $R$  in Fig. 69. The vertical component of this line is the force of 12,500 lb. and the horizontal component is the force of 1,143 lb. The drag component of this resultant may readily be found. Then:

length of Resultant =  $\sqrt{12,500^2 + 1,143^2} = 12,560$  inches.  
Resultant Force =  $12,560 \times 33.0/30.0 = 13,500$  lb.  
Drag Component =  $13,500 \times 33.0/30.0 = 14,850$  lb.  
Vertical Component =  $13,500 \times 1.143 = 15,330$  lb.  
Total component must be sustained by 1,143 to be applied at the strut pin. Their new values then are:  
Drag Component =  $14,850 + 1,143 = 15,993$  lb.  
Vertical Component =  $15,330 + 1,143 = 16,473$  lb.

Bending in Level Landing (Axle takes all bending in this case).  
Bending due to  $V$  load  $M_v = 6706 \times 4 = 27,040$  in. lb.  
Bending due to  $D$  load  $M_d = 1980 \times 4 = 7,920$  in. lb.  
Resultant Bending Moment =  $\sqrt{27,040^2 + 7,920^2} = 28,280$  in. lb.  
This moment  $M$  and  $M$  are acting in places at right angles to each other. This result could be obtained by multiplying the resultant load 7150 lb. by the moment arm of 4 inches. This is  $7150 \times 4 = 28,600$  in. lb.

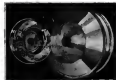
Level Landing—Calculation of Stresses in Struts.

Member	Stress	Stress	Stress	Stress	Stress
Front Strut AB	15,993	15,993	15,993	15,993	15,993
Rear Strut AC	-13,330	-13,330	-13,330	-13,330	-13,330
Rear Strut AD	11,111	11,111	11,111	11,111	11,111

The drag  $V$ -component multiplied by the stress in each strut is the total  $V$ -component will give the total stress in the strut due to vertical loads. The stress due to drag loads is found in the same manner. The  $V$  and  $D$  components above have been determined that their added effect will give the side force at the strut under the requirements of level landing. This side force is here shown in the above table, the stress due to the  $V$ -component being added to that due to the  $D$ -component and the result found in the last column.

### Level Landing with Side Load

In this condition the forces are the same as those in level landing with an additional side load applied at the ground. The side force is assumed to be a side force of 25 x 4 inch



## Efficient stopping

Especially designed for airplanes, this Bendix 4 Brake (See Photo) is the most powerful brake known, yet simple enough to install, dependable, perfectly serviceable. It is based on the general principles of the internationally known Bendix Brake for motor vehicles.

Write and inquiry now to producers on standard size.

(Fully guaranteed by contract and application to U. S. and abroad.)

BENDIX BRAKE COMPANY  
General Office and Plant: South Bend, Ind.  
Branch: Bendix Corporation, Chicago

**BENDIX 4 BRAKES**  
FOR SAFETY

**MILESTONES OF PROGRESS**

## They come from all over

From every part of the country, men come to the SWALLOW plant in Wichita to buy SWALLOWs.

Where we have a dealer in the territory, of course we turn the business over to him. Yet there are some places where there is no Swallow dealer as yet, and we are forced to sell direct to the customer. It's "dollars to doughnuts" that before 1928 it ever occurred to the Union that the boys of a number of our 1928 SWALLOWs. Suddenly will get that same business. Will it be you?

Better write or wire us today to see if YOUR territory is still open.

**SWALLOW AIRPLANE CO.**  
WICHITA, KANSAS









# AIRPORTS AND AIRWAYS

## Dallas, Tex.

By Bruce E. Gaudin

Howard Woodall and C. W. Shaw, state distributors for the Travel Air, recently made a trip to the factory at Wichita, Kan., on an OX-6 Travel Air. Woodall says the enrollment of students and the sales of planes are holding up well considering the generally turbulent spring season in Texas.

Arthur J. Resnikoff, street commissioner of Dallas, is the first of the city officials to actually take to the air. Commissioner Resnikoff has completed his flying course under the instruction of Lieut. Harry Waddington. This is probably a last for other officials to follow as it has been announced that district attorney William McCraw will purchase a plane for the use of the district attorney's office.

The "Voice of the Skies," a two-engine Pietenpol equipped with a specially constructed radio transmitter and amplifier, recently made its appearance at Love Field. Built in the Pietenpol are three large speakers. A voice can be distinctly heard while the plane is cruising at an altitude of 3,500 ft. The plane is being used for advertising purposes. Lew Gerner, pilot, Les Gordon, mechanic, Geo. W. McClellan, instructor of the radio equipment, and Freddie Bell, instructor, were guests at the regular meeting of the Dallas Flying Club. Three hours were all allotted to insure that Dallas had purchased Love Field as a municipal airport, saying that it was one of the best landing fields they had visited anywhere.

Baron Wenden, well known Texas flier and former war pilot, is now connected with Good & Pastor of Dallas. Wenden and Good served during the war together and later were associated with the Curtiss Southwest Airplane Co. at Tulsa, Okla. Good & Pastor has purchased a Ryan Broughman powered with a Hams, which will be used for passenger and

cross-country work. The plane was piloted by L. Wenden from Tulsa.

Horbert Knudsen, who has been an air mail pilot for the N.A.T., since the inauguration of the Dallas-Chicago route, left recently for Germany where he will take charge of a commercial air line operating out of that city.

The city of Dallas is contemplating the purchase of an other landing field which will be used by the sports and training corps. Present plans call for the field to be located just north of Love Field. This will separate the military and commercial flying activities and should be a great help to both.

## Garden City, L. I., N. Y.

By M. Brown

Out of a leader city, with runways beginning to sprout, the first plane containing the Trans-Atlantic Club, Dr. and Gertrude von Harrold, Capt. Hermann Kordt, and St. James Fitzmaurice. They were supposed to be coming to New York, but on April 27, so their departure on Love Field at 1:30 P.M. was somewhat unexpected. The plane, in which students were taking instruction, were all invited to landings when the plane was sighted. Several hundred people were gathered at Curtiss Field, but all crowded around the plane as soon as it came to a landing.

St. James Fitzmaurice, pilot, descended at once from his cockpit, but the three remained in the plane while the plane was being refueled. Filled with luggage, the plane did not leave as it could have been a very comfortable place for the passengers, during the storm hour flight from Murray Bay, as they appeared to be in good humor. Fitzmaurice and his crew made a bright splash of color. The boys leaned against the wall, adjusting his monocular. Kordt sat on a radio and read with intense interest a German newspaper—



Curtiss Field, Major Fitzmaurice, and Baron von Harrold, sent west Atlantic flier, land at Curtiss Field, L. I., N. Y., in the Ford Relief Plane piloted by Ernest Bell. Only a few who knew of the coming of the Trans-Atlantic Club were present. The Trans-Atlantic Club, in the photo above, on this initial arrival in New York from Canada.

John J. were presently back away from him. The remainder of the trip to Washington, however, had to be made by ship.

Chamberlin flew into Curtiss Field in a Fairchild plane, piloted by the Ford relief plane, but did not take off again.

Curtis has started a new course of cross-country instruction, in a Fairchild plane for the training. William Wenden made the first instruction flight when the new course was started.

## Phenix, N. Y.

By David F. Emswiler

Since its organization last fall the Council Flying Club has been to receive considerable interest in aviation at the University and in Phoenix. The attempt of the Club to secure the location of an aerodrome near the University and the University of Pennsylvania has been greatly hampered by the fact that the faculty was temporarily shut down, but the outlook is bright for such a course next fall. Attendance at Prof. Frederick Rodin's Elementary Aerodynamics course in the Department of Physics and Prof. G. B. Upjohn's Aerodynamics course in the School of Mechanical Engineering has been greater than in previous years.

At the winter meetings of the club it was possible to obtain a number of well qualified speakers on aviation topics. Among them might be mentioned C. I. Mitchell, who described the principle of the Hotchkiss-type sliding wing, Professor Upjohn, who spoke of "The History of Aviation," and Dr. F. O. Rodin, who described and illustrated some phases of aviation engine development. Professor Upjohn was directly connected with the development of the Liberty engine during the war, while Professor Rodin was in charge of the aviation engine section at the ground school at Curtiss. As a matter of interest, this ground school at Curtiss was one of the first to be started after America's entrance into the war. Phoenix is also the home of the Trans-Atlantic Club, which our war-time flier knew so well. W. E. Thomas, of the Thomas-Morse Aircraft Corp., has accepted the invitation of the club to speak at its next meeting.

## Elmore, N. Y.

By Felix Gaudin

Alfred R. Stanley, head of the Stanley Airways, Inc., of the city, commercial operator, has purchased two new Waco 10s for use during the summer at the Elmore Airport. He wants to use the Waco 10s which he purchased last summer. Ralph Rogers, Mr. Stanley's pilot, flew the plane from the Elmore Aircraft Co.'s plant in Troy, N. Y., to the local airport.

The Southern New York Flying Club, recently organized, has elected the "Warren System" of flying instruction, used by the U. S. Army, for the training of its students. Several business men have joined the club to take advantage of special rates offered for the use of planes. Edward A. Myers is temporary president of the organization.

"Air Mail Week" will be conducted in Elmore during the fall week in June in an effort to create interest in the use of air mail in the shipping of their city as one of several proposed routes. Plans are now under way for bringing some of the nationally known fliers to the city.

## Spokane, Wash.

As word hovers of the Spokane postoffice has shown substantial movement each month this year, according to figures recently compiled by Thomas J. Smith, postmaster.

In January 6750 pieces of air mail, weighing 128 lb., were sent out. In February figures increased to 7515 pieces, and 1715 lb. In March 8550 pieces and 206 lb., and in the first 15 days of April 4283 pieces and 104 lb. These figures are the



## Austin Designs and Builds Aviation Buildings

AUSTIN designs, constructs and equips A-1 efficient buildings, interior layouts and other structures at low cost.

Austins are constructed with complete plans and specifications for materials and construction. Austins will also design and build other structural requirements for aviation by a local building at a guaranteed saving in time, money and expense. Representative quotations from clients to whom have used Austin building services.

Ask for estimates and folders.

## THE AUSTIN COMPANY

Architects, Engineers and Builders for Aviation Buildings

CLEVELAND, OHIO  
New York, Chicago, Philadelphia, Los Angeles, San Francisco, Portland, Seattle, Tacoma, Vancouver, British Columbia, Canada, Mexico, Central America, South America and the West Indies.

## PlaneTalk

— Test fly them, attached to every Ford Air Talk are listed and covered by the owner as arriving at their station.

## FLIGHT RECORD

Last known to BOSTON, Mass.  
Last known to BOSTON, Mass.  
Last known to BOSTON, Mass.  
Last known to BOSTON, Mass.  
Last known to BOSTON, Mass.  
Last known to BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.

Flight record of BOSTON, Mass.





Richard Scully, popular across the air and aviation circles, wearing a Scully helmet.

## SCULLY Air Mail Helmets

Designed and perfected after many tests by air mail pilots

**Made from Finest  
Imported Leathers**

SCULLY HELM, Inc., 717 E. Washington St., Los Angeles, Cal.  
Manufacturers and Distributors for the West

HIGHLAND-BEAZLEY AIRPLANE CO., Marshall, Mo.  
Distributors for the United States from Denver East.

## Can You Fill This Position?

A FINANCIALLY responsible company, operating large passenger ships for sight-seeing and taxi work, also acting as distributor for new airplanes, wishes to obtain the services of an experienced hustler, capable of managing an airport in the promotion of business, sale of airplanes etc. He must have general executive ability. He must be a pilot with at least 1000 hours "in the air", know Liberty engines and must have a clean record.

This is a big job with a big future. The right man will make a profitable connection. References required.

Address Box 563-Q, AVIATION.

first 15 days of April kept the figure down, but in both cases and possibly the month is expected to better the 1934 record.

Two more Waco 20 airplanes will meet monthly by E. N. B. Moore of the Master Flying Service, Spokane, who has the Spokane agency for the Waco and Biplane type airplanes.

Both of the planes were purchased by Pacific coast mail delivery flying organizations, one of them being the West Coast Flying Service and the other the St. John Air Line from Chicago.

### Centralia, Wash.

Work of grading the new Centralia, Wash., airport is being started. Plans for the new field include construction of a hangar. The Davis Brothers, graduates of the Radio School of Flight at Portland, Ore., maintain the ownership of a school at the new field.

### Toledo, O.

By David E. Hays

Richard Wall, president of the Toledo Lumber Co., all member of the National Safety Council, recently, from a radio-wide trip in the New York American's Blimp airplane, "Dink" in which he discussed new by land, state and other organizations.

"Aviation—The New Industry," was the subject of a talk given before the recent manufacturers' dinner at the chamber of commerce by G. H. Kays, president of the Central Airplane and Motor Co. Kays recently was an official of the Whips-Overland Co. and is highly regarded as a speaker in manufacturing subjects.

The Toledo Transit-Centralia Airport is located nearly nine miles south of the village of Wadsworth, O., and six miles out of Toledo. This fact has caused the former village to demand that the field be designated as "Toledo" Wadsworth. Its chamber of commerce has served formal notice of its protest as a newspaper in the vicinity.

Pilot G. P. Hays, operating on the Ford air mail contract line between Detroit and Cleveland, was forced down by fog and rain near Oak Harbor, O., recently. He was surprised to find it so foggy and too much of a rain. A safe landing after take off was made. The mail was forwarded by train.

Upper Sandusky, O., a small city on the lake between Toledo and Cleveland, will point the same in 14 ft. later stop the Citizens Savings Bank building there. An accompanying month also will be pointed on the road.

Harold E. Wall, chief pilot for the Becker Sealing Co., will spend several days here carrying the Sandusky and faster districts for his company.

One of the large Fokker planes now being completed at New York for the Western Air Express will stay at Toledo on its way to California, it was announced recently.

### Cincinnati, O.

By Charles E. Plumb

Every member of the Enckey-Biddle Co. at Lorain Airport, due to the All-American Aircraft Show at Detroit and during the week, Enckey-Biddle planes carried 10 Cincinnati visitors to the show.

Radio messages and the Enckey-Biddle planes in the company were kept busy all week ferrying passengers and mail to and from Detroit. Every Enckey-Biddle plane carried two passengers in a "Whispered Waco" mail plane. John P. Biddle, Stanley G. Hoffmann, and Warren Vane piloted the other planes. Students in the Enckey-Biddle Flying School were all urged to attend the show and eight radio pilots. Cincinnati was well represented at the show, a special load of 50 business men making the trip on Wednesday.

day work. They comprised the official representation of the Enckey-Biddle firm represented at the show. These included 10 Enckey-Biddle planes, with three of its new radial air-cooled engines on display, the International American Co. with a hangar and an open job on the floor, the new Hildebrandt, a Cincinnati product, and the Enckey-Biddle Flying School.

Up until now declared the show a fine success, visitors being served at every one of the Cincinnati companies' displays. Through interest shown by its easy course, for which a hangar course was given from Miss Marion Taylor, West Coast newspaper woman, for the last essay on "Try I Want to Learn to Fly," some 300 new students have been enrolled in the Enckey-Biddle Flying School.

### Cleveland, O.

Announcement was recently made of a municipal take back report to be submitted for the City of Cleveland in the near future. The site for the new airport will be the site of land returned from Lake Erie by the New York Central and the Pennsylvania railroads which is now to be exchanged for another tract of land belonging to the city. The airport would be located virtually in the heart of Cleveland.

The site comprises nearly 600 acres and runs on a line 1000 ft. south of and paralleling the government reservation. The new port will provide runways of 2000 and 5000 ft. in length.

Book Park Airport will be further developed, Manager Repton stated, to handle the bulk of the city's aerial traffic in conjunction with the new airport.

### Detroit, Mich.

By John T. Smith

William B. Smith and Edmund F. Smith, co-owners of the "Pulse of Detroit" in Toledo, Japan last fall for the "Pulse of Detroit" to the Detroit convention recently held in Miami, Fla. Other members of the group on the journey south were Dewey S. Schuler, brother of "Ed." James Schuler, Jr., M. A. Davidson, and Lewis Ross, all of Detroit. The signs of the famous Shuman monoplane was given an outburst at the Shuman plant just prior to the Miami flight.

Mr. Marion Taylor, 31 yr. old air editor of the Detroit Free Press, winner of the flying contest offered by the Enckey-Biddle Flying School, Cincinnati, during the All-American Aircraft Show here, plans to leave for London Airport, Cincinnati, soon to begin taking instruction. She plans to spend about two months taking the course and will return to Detroit in the early next year. She is now in the city. Mrs. Taylor was the flying course by writing an essay on "Why I Want to Learn to Fly."

### Niagara from the Air

Representatives are said to be under way whereby Great Air Service, Inc., of Detroit, will supervise operation of Sky-Vue Lines, Inc., an airplane engineering project organized by Dr. William of Niagara Falls. Operations will begin about May 30. The new company has ordered a 10-motored Ford amphibious. Operators of the company include William B. Smith, E. L. Woods, and James E. DeVoe, all of Detroit, and Fred E. Cox, of Niagara Falls, N. Y.

Edward B. Evans, chairman of the Board of Commerce Aircraft Events Committee, has left on a month's airplane flying trip through the South and West. Mr. Evans will visit cities in Missouri, Oklahoma, Texas, Arizona, California, Oregon, and Washington before returning to Detroit about May 30. Jack Price will pilot him in a Shuman monoplane belonging to the "Pulse of Detroit" organization.

Carl E. Fritzsche, general manager of the Aircraft Development Corp., was a recent speaker before 300 students of

## RADIO EQUIPMENT for AIRPLANES and AIRPORTS

The Radio Corporation of America is prepared to analyze and quote prices on modern aircraft equipment of the following types:

1. Plans to place, and plans to provide combined telephone and telegraph equipment.
2. Airport combined telephone and telegraph transmission for communication between:
  - (a) the plane and the airport ground station via radio telephony, or radio telegraphy, and
  - (b) between airports via radio telegraphy.
3. Beacon transmitting equipment for guiding the planes during adverse weather conditions and suitable receivers to receive on the planes from the ground station beacons.

**RADIO CORPORATION OF AMERICA**  
233 Broadway New York City

## Aircraft Manufacturers & Dealers



**WE own and offer for sale for immediate delivery a large stock of 150 H.P. and 300 H.P. Wright Hispano-Suiza motors and parts. Don't neglect the opportunity. Write or wire for prices. State quantity desired.**

**Southland Jobbing House**  
Nashville, Va.



*faster!*

Speedy valves mean a sharp increase in rate of power increase but consumption and the other great things of an engine.

## MILLER VALVE ACTIONS

will make a marked improvement, speeding up your motor, making it purer, and smoother running under all conditions. They have been used on many successful engines in the C.O.S. series, and have increased the R.P.M. 25 to 30 revolutions.

Price, complete set of Miller Valve action for 8 cylinders ..... \$10.00  
 One complete set for 4 cylinders ..... \$5.00  
 C.O.S. direct from the set — we will ship the same day we receive your order.

C.O.S. Engine Manuals, 25c  
**Nicholas-Bentley Airplane Company, Inc.**  
 235 So. Eighth St., Seattle, Wash.



Distributor proposition for parties with airport facilities and funds to handle sale of Laird Com. several planes for a territory.

**E. M. Laird Airplane Company**  
 4100 West 81st Street, Chicago, Illinois

We are equipped to say any way with any other manufacturer of airplanes. Laird Plans are built only at the E. M. Laird Company factory, Auburn Park, Chicago, Ill.

**TITANINE**  
 Reliant Trade Mark

**A Complete Range of AIRPLANE FINISHING MATERIALS**

Deep-pour paint, black, white, aluminum or grey.  
 Clear varnish and enamel dyes.  
 Various colored var-nitrocellulose dyes.  
 Finest water dyes.  
 Flexible wing lacquer.  
 Wood and metal lacquer (for inside and outside finish).

**TITANINE, Inc.**  
 Union, Union County, New Jersey  
 Concerned in the United States Government

Features High Island, Detroit. He spoke on the opportunity of going into the aviation.

The Union Trust building management has placed a 25 to 30 ft. aerial machine on the roof of their building. The machine is said to be plainly visible from an altitude of 1,000 ft.

**Portland, Ore.**

By John R. Anderson

May 10 has been set by J. G. "Tex" Rankin as the day for the start of regular airplane passenger and express service between Portland and Tacoma, Wash. Plans call for round trips six days a week. The two Ryan monoplanes of the Rankin Flying Service will be used on the run.

The Portland Chapter of Cosmocon is actively supporting the venture. Letters have been mailed out to all members of the city urging them to patronize the line.

Twenty-five graduates of the Rankin-Gall Aviation School in Portland have expressed to the cost of acquiring hours of flying necessary to qualify for a transport pilot's license. The men will invest about \$100 each way which to buy a plane. Costs of operation are to be paid among them. With this plan they hope to pile up all the hours of flying needed.

Ten Rankin pilots to enter two or three planes in the aerial circuit to be staged at Walla Walla, Wash., May 18 and 19. The Tacoma Airways Co. of Tacoma, Wash., the Gray Harbor School of Aviation, Aberdeen, Wash., and the Lewis School of Flying, Puyallup, Tacoma, have accepted the Rankin system of flying instruction, according to J. Koppman, general manager of the Rankin School.

Capt. Frank Moore, mapping expert for Continental Airways of Portland, has been busy mapping a large tract of land for a California lumber company. He works a Ryan monoplane piloted by Earl Gordon H. Moore, chief pilot and general manager of the company.

**Roseburg, Ore.**

Oregon Agricultural College experts have been called on to recommend an place for the new flying field at Roseburg Co. for which \$25,000 worth of bonds were voted recently. F. E. Freen, soil specialist, is studying the ground on the site with a view to recommending proper drainage facilities and the best variety of grasses for seeding. The college will be called upon for other technical advice.

**Oklahoma City, Okla.**

By Ernest F. Fox

J. L. Madison, president of the Madsen Air Lines Co. in Los Angeles, was in Oklahoma City recently on a business trip with his wife, Laverne Fata, J. Miller, Mrs. A. J. Allen, and Mr. and Mrs. J. L. Korman of Los Angeles. Madison, while here spoke of plans to establish an airport westward from Los Angeles through Oklahoma City. H. C. Martin of the aviation committee of the local chapter of Cosmocon has announced that radio equipment for broadcast the weather reports and auxiliary dispatching service will be installed at the airport by July. H. W. Patten has been named as special airways observer.

H. H. Tuckerton, Oklahoma City sales representative of the Alexander Engineering Co. has been selling many plans in the territory.

Three hundred employees of the McWane Ballistics Co. local drydock company, were given free rides recently to the local airport to receive of their firm. An automobile bus was provided for the employees, the work being in charge of John McCarty of the company.

The Central Aero Club has been informed at Coast High School and is building model airplanes as one of its projects.

students in learning the principles of aerodynamics. The club meets in one of the manual training rooms of the high school every Wednesday afternoon with Paul Bell, electrical instructor, and C. A. Parker as sponsors. The new club members are Wendell Bailey, Ed Garrett, Jack Poshinski, Robert Taylor, Wayne Thomas, Herman Collier, Ed Stone, Ed Ray, Kim Deane Hanson, Paul Sheffer, Perry Griffin, Jack Ryan, Don Lashley, Oleville Mills.

**Duncan, Okla.**

Duncan is another one of the outgrowing small towns of Oklahoma that is planning on development aeronautically. Local towns of Oklahoma have nearly all striven to the aeronautical development because being one of the best in the state.

The city has recently acquired a municipal airport of 40 acres of land adjoining the fair grounds just north of the city. These 40 acres were bought at a price of \$100 an acre, it has been reported.

Plans, having bought its air field and equipped it, is now going for a place in the state air base. Ben F. Davis is president of the aviation committee of the Duncan chapter of Cosmocon, and has been very active in all aeronautical work.

**Robert, Okla.**

The chapter of Cosmocon here has agreed a five year lease on a 60 acre tract to be used for an airport, and work has been started on the field in condition it for the state air base of the Oklahoma State Chapter of Cosmocon which is to open in Robert about May 15. Two planes are owned by the chapter and some more have been collected. Plans are now under way to mark the new field in the manner required by the Department of Commerce for temporary landing fields.

**Hubbuck Heights, N. J.**

Report on the activities at the Tebichon Airport for April show a decided increase in air traffic over that of the previous month.

During the month, 43 airplanes utilized the airport, 20 airplanes receiving fuel, and 26 departing for, many other points in the United States and Canada. In all, they carried 1,000 passengers, in addition to baggage, freight, mail, etc.

In order to meet the ever increasing demand for pay pilots and to accommodate the many students, the Glaser Flying Circus and Flying School, which operates daily at the airport, has expanded its fleet of aircraft by two new "Chalmers." The latest on the above report are the many short hops made on the field by the Pugh 22 passenger P-16, Super 16 engine monoplane recently built by the Atlantic Aircraft Corp., whose factory is adjacent to the airport. These flights included trips over Manhattan with many visitors, among whom were Charles A. Levine, Rear Admiral Cdr., U.S.N., of the Grapeshot Field, etc., and also, a trip to Washington and back.

The practicability of Tebichon Airport as the New York or New Jersey was again demonstrated during the month when several air transportation services landed here for the purpose of delivering them.

Members of many trips and makes were seen around the field—Bellevue, Fairchild, Fokker, Ford, Stearns, Travel Air, DeSoto, Waco, and the famous old Jolly.

**Winston-Salem, N. C.**

By Arthur Carmichael, Jr.

With the arrival of new equipment for Miller Municipal Airport here and the announcement that Reynolds Aviation, of North Carolina, Inc., the house, has closed negotiations with representatives for several states of planes, aviation being locally is showing a decided pick-up.

A Police National State passenger club monoplane has

## UNION SPECIAL SEWING MACHINES

for aircraft manufacture

Union Special sewing machines are ideal equipment for the aircraft factory. They are built from the ground up to produce perfect work in ready finishing production. There is a proven Union Special machine available for every manufacturing purpose.

The famous Union Special double locked stitch (U. S. Government Standard stitch Type 401) on Union Special machines has greater strength, security and durability. It makes a seam which even on the bias has a perfect elasticity equal to the full stretch of the fabric. This assures full strength and perfect fit with our design of breaking stitches. Give Bureau of Standards Technological Paper No. 96).

Our engineers will gladly cooperate

**UNION SPECIAL MACHINE CO.**  
 400 N. Franklin Street  
 Chicago, Illinois

**RELIABLE!**  
**HARTZELL PROPELLERS ARE RELIABLE**  
 20 Years Experience Behind Our Service  
**HARTZELL PROPELLER CO. PIQUA, O.**

## Seamless Steel Tubing

ROUND, STREAMLINE, ETC.

Furnished to Specification in

STRAIGHT CARBON

NICKEL STEEL

CHROME MOLYBDENUM

Available in Aircraft Fabric—Manufactured for 25 Years.

**SUMMERILL TUBING COMPANY**

BRIDGEPORT, MONTG. CO. (Philadelphia District) PA.

just arrived and is proving quite popular. It has been busy with short hops and some rather extended flights have been made. The plane has been chartered for several-day trips to local parties, the trips to be made shortly. The monoplane was piloted by William Hilde, from Corbin Field, N. Y., by August Hilde and is being handled here by Loren McGinnis, manager of the airport.

Much improvement has been made in the field during recent weeks and a force of men will be kept busy until it is in the best possible condition. Now and then being placed on the outer edges of the field, where small patches uncovered and the entire landing space is being smoothed over.

#### Lincoln, Neb.

By Thomas Price

While returning to Washington, D. C., from San Diego, Calif., where he delivered a new Amphibian plane to the airplane carrier Stevens, Lieut. Comdr. Louis C. Stevens, United States Bureau of Aeronautics and the second command-line department, recently landed at the Lincoln aviation field and visited with relatives.

Lieutenant Commander Stevens is a former Lincoln man and student of the University of Nebraska and Nebraska Wesleyan University here.

#### Stevens Ties and Designs Airplanes

During the Navy's attempted flight to the Hawaiian Islands several years ago, Mr. Stevens was in charge of the airplane workshop at the post plane. He was then stationed on the old airplane carrier Stevens. Since serving his pilot's wings for six years ago he has kept his skill in the air plane as well as in designing them. He has been in the Navy nearly 20 yr.

Junior, Angel, Fresno, Calif., for up a 25,000 on Pre-

American flight, learned to fly at the aircraft school here under Col. Charles Lindbergh last few weeks.

Airport "down in" from Texas several years ago and a dozen or more aviation and sailing club, Ray Page, who is of the Lincoln Standard Aircraft Co. and flying school, with. Although a "hard-core" type Angel soon developed into a fair mechanic and a capable flier.

After painting the stands for five years as a true pilot, Mr. Stevens has taken his motorcycle to the same. He has occupied a position in the aviation department of the Lincoln Aircraft Corp. and intends to visit through the airplane manufacturing departments into the same division.

Stevens has always had a keen interest in aviation and during his countless long short seasons in flying. He has had his lot of flying instruction, chiefly in cross-country work.

#### Pittsburgh, Penna.

By Ray C. Tucker

Pittsburgh just recently became a hub as a three connecting with a continuous survey express service, when Doug Noyes, air mail pilot, took off for Cleveland from State Field in an airplane-hired Ryan monoplane.

The event was greeted by appreciative crowds estimated by more than a thousand spectators. The program consisted of short address by Mayor Charles H. Kline, City Hall, the Air Mail & Express Contractor, and the following address of the American Railway Express Co. The President C. W. Robt. Sen. Mgr. P. J. Harvey, and J. W. Johnson, local district manager.

The Aero Club of Pittsburgh which just recently announced its plans for holding the Third Annual Ray Model Airplane Contest, has decided to adopt the rules of the National Model Aircraft Tournament which has been announced by the

Figured & Hertzmann Association of America, and thus get the visitors a chance to compete in the national finals at Madison City in October.

#### Madison, Wis.

By B. C. Browne

Orders for the purchase of two Travel Air biplanes from the Mid-West Air Transport Co. of Madison, were signed in bulk recently by the United States Army Co. W. A. Blumstein, president of the Mid-West Air Transport Co. of Madison and the office. The Madison company is state agent for the Travel Air planes.

Eugene E. Crowley, a brother of Lee T. Crowley, Madison, a president of the United States Army Co. Its stock is controlled by United States Army and it was on 55 some landing field only in the midst of a 400 acre farm, near Beloit.

Decided among those who have recently signed orders with the Mid-West Air Transport Co. for planes are L. C. Hoff, Madison insurance man; Robert Eutfield, Richard Lutz, Harry Swanson, and the Oakbrook Aircraft, Inc., all of Oakbrook, and Henry Gerald of Appleton, Wis.

#### Superior, Wis.

The Board of the Lake Flying Club, which was organized soon last year, is meeting every Wednesday morning to discuss the various phases of commercial aviation. At the present time the members are studying the design, construction, capacity, operation, and maintenance of several well known airplane types. The meetings, which alternate between Superior, Wis., and Duluth, Minn., are under the direction of Walter Sandberg as president, Frank O'Brien is vice president, LeRoy is secretary, and L. S. Rieps the treasurer.

#### Port Sanilac, Mich.

A 40 acre airport is planned by the tiny Michigan village of 150 people. Latest equipment comprising night harness, spot lights and other apparatus will be installed at the new airport. Village authorities are being asked in planning the airport by Jack Workman of the Michigan State Aviation Club, Detroit.

#### Waukegan, Ill.

By Jack H. Bell

The city in the organization of a municipal airport by the city of Waukegan was finally cleared recently by the approval of the city's board of estimate and taxation of a \$15,000 bond issue to take care of the cash payments on the purchase.

The city's park board approved the purchase of Waukegan Field for use as a municipal airport some time

#### Lake Father, Mother, and Child



A white family of eight was presented when these three first recently gathered on the San Antonio, Tex., municipal airport, but A. P. Berg, who designed the subject plane on the left, will be the "Gawney," hence the daughter is sitting. The large monoplane is a Ford-built, while the plane in the foreground is a Ryan Brewster.

# Grass



for...

## Airports and Landing Fields

Our 20 years of experience in supplying and advising with landing fields, Congress, Police Clubs and our intensive study of the production and maintenance of the best turf for various purposes, places us in a position to give authentic and dependable information in regard to suitable turf for Airports and Landing Fields. We applied to offer this knowledge to the aircraft industry.

#### Airport Formula

We offer a formula, showing it is possible to get the most out of the money available, resulting in a great deal of money and with no loss of time or effort. We applied to offer this knowledge to the aircraft industry.

Landing Field  
Construction  
Equipment  
Methods

**Stump & Walter Co.**  
30-32 Barclay St., New York City

## LINDBERGH FIELD

Is Now Under Construction in

## San Diego California

"THE AIR CAPITAL OF THE WEST"

Attention! Airplane sales, San Diego's magnificent climate for your record flying, touring and world-famous, plenty of flighted land at reasonable prices, the finest of all private and commercial air, and many other advantages are offered in general literature to the San Diego Airport Authority.

Write to: INDUSTRIAL DEPARTMENT  
Chamber of Commerce

708 Chamber of Commerce Bldg., San Diego, California

**Let the World's Leading Flying School Train YOU!**

**Learn to Fly by Flying**

None of them is the greatest thing about it — also that it is the only one that is. **ACTUAL EXPERIENCE** in building and assembling planes — construction and repair work — and actual flying under the guidance of a pilot who is a member of the United States Army. That's why the Marshall Flying School is the only one that is.

**MARSHALL FLYING SCHOOL**

408 North English St., Marshall, Mo. (Affiliated with National-Bushy Airport Co.)

**the ideal HANGAR for airplanes**

NO COLUMNS  
NO TRUSSES

Architectural drawings show the perfect building for all kinds of aircraft, including airplanes, in from perfect steel and reinforced steel in the most convenient to build. Space of 40 feet and more.

Further information on design, cost, service, delivery and construction of this hangar and other buildings.

**ARCH ROOF CONSTRUCTION CO. INC.**  
Engineers and Constructors  
146 West 44th St., New York City

**SEAMLESS STEEL TUBING**

All Aircraft Grades

Warehouse stocks for immediate shipment at any quantity.

MMA, shipments for educational production requirements.

**SERVICE STEEL COMPANY**

2457 Franklin St. DETROIT

45 John St. CINCINNATI















## TRAVEL AIR

Travel Air planes hold many records of accomplishment.

- winner of the 1926 Ford reliability tour.
- winner of the Dole Honolulu flight.
- thousands of flying hours weekly in carrying mail, passengers and express on transport lines.

Six types bi- and monoplanes are now being built, including a new cabin monoplane of Pullman car comfort. Deliveries now average 20 new ships a week from its modern new factory.

Travel Air tests all ships, and flies the tanks of these planes for 800,000 miles with PHILLIPS 77, knowing that in doing so, the standard of performance of their ships after leaving the factory will be as high as that employed in their manufacture.

PHILLIPS 77 is a stable, 100% natural gasoline made especially for aviation use by the world's largest manufacturers of natural gasoline.

Now available at Chicago, Iowa City, Des Moines, Omaha, North Platte, Cheyenne, Rock Springs, Salt Lake, Wichita, Bartlesville and Amarillo airports.

**Phillips Petroleum Company**  
Bartlesville, Oklahoma

NATURAL GASOLINE FOR CONTROLLED VOLATILITY



TRADE MARK for controlling AVIATION

# SIKORSKY

## ACHIEVEMENTS



SIKORSKY Seabee float Plane Type 537B



SIKORSKY Twin-engine 16 Passenger Commercial Plane Type 5-17



SIKORSKY Twin-engine Amphibian 6 Passenger Type 536

**Sikorsky Manufacturing Corporation**  
College Point, L. I., N. Y.

TRADE MARK for controlling AVIATION



# At the All-American Aircraft Show...

Practically every plane powered with a modern American-made engine, was equipped with an Eclipse Aviation Engine Starter—reflecting emphatically the trend toward greater reliability, safety and convenience in starting.

Eclipse Aviation Engine Starters are available in a wide range of types and sizes particularly adapted to application on all modern domestic engines. In designing new motors or in modernizing present motors by the application of starting equipment, a co-operative technical service, with a background of twelve years' experience, is at your command. Write for full information stating engine in which you are interested.

ECLIPSE MACHINE COMPANY  
East Orange Plant, East Orange, New Jersey  
Elmira, New York • Walkerville, Ontario



# ECLIPSE

AVIATION STARTERS AND

GENERATORS

